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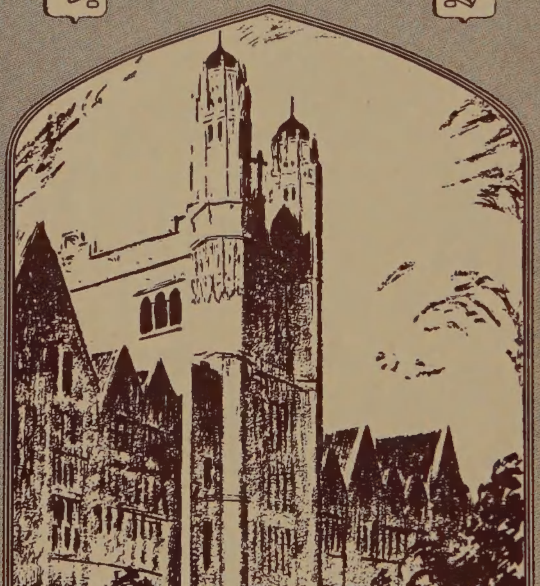

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THE
BRYOPHYTES OF CONNECTICUT

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PREFACE

The plants treated in the present report are largely neglected by collectors, partly on account of their small size and the difficulties encountered in their identification, partly on account of their slight value from an economic standpoint. To the student of botany, however, and especially to the morphologist and taxonomist, they are of exceptional interest. The morphologist finds among them all gradations between simple and more complex types of structure, and is thus enabled to gain some idea of the way in which the higher plants may have been derived from the lower; while the taxonomist obtains from them a series of distinct and attractive genera and species, which offer for his solution many complicated problems in variation and geographical distribution. In presenting to the botanists of Connecticut some account of the work which has been done on the Bryophytes within the state, it is hoped that more interest in this neglected group of plants may be aroused.

The report includes a general description of the Bryophytes as a whole and of the six subdivisions or orders into which it seems advisable to divide them. It also contains keys, more or less artificial, to aid in the identification of those species which have been detected in Connecticut. But it makes no attempt to describe or illustrate the genera and species represented, and is not intended as a substitute for the works in which such descriptions and illustrations are to be found. The student who makes a careful study of our Mosses and Hepatics will still find it necessary to use books of this character in order to confirm the determinations made by the keys, but the report should make the work of determination more decisive by indicating which species are to be expected in our region. The various books, articles, and scattered notes, which relate directly to Connecticut Bryophytes, are listed in the bibliography at the close of the report. The following recent works (not included in the bibliography) may also be recommended: —

1. Braithwaite, R. The British Moss-Flora. Vol. I, pp. x + 315. 45 plates. Vol. II, pp. 268. Plates 46-84. Vol. III, pp. 274. Plates 85-128. Large 8vo. London, 1887-1905.

2. Howe, M. A. The Hepaticæ and Anthocerotes of California. Mem. Torrey Club, 7: 1-208. Pl. 88-122. 1899.

3. Warnstorf, C. Kryptogamenflora der Mark Brandenburg. Band I. Leber- und Torfmoose. pp. xvi + 481. Band II. Laubmoose. pp. xii + 1160. Fully illustrated by text-figures. Leipzig, 1902-1906.

4. Dixon, H. N., and Jameson, H. G. The Student's Handbook of British Mosses. Second Edition, pp. xlix + 586. 65 plates. 8vo. Eastbourne and London, 1904.

5. Roth, G. Die europäischen Laubmoose. Band I. pp. xiii + 598. 52 plates. Band II. pp. xvi + 733. 62 plates. Large 8vo. Leipzig, 1904-1905.

6. Roth, G. Die europäischen Torfmoose. pp. viii + 80. 11 plates. Large 8vo. Leipzig, 1906.

7. Müller, C. Rabenhorst's Kryptogamen-Flora von Deutschland, Oesterreich und der Schweiz. 2. Auflage. Band VI. Die Lebermoose. Incomplete. Six fascicles, comprising 384 pp. and 225 text-figures, have already been published. Leipzig, 1906-1908.

In the study of certain critical families and genera the writers have received much assistance from Mrs. Elizabeth G. Britton, of the New York Botanical Garden, Mr. C. Warnstorf, of Berlin, Germany, and Mr. J. Cardot, of Charleville, France. Other correspondents, who will be mentioned particularly in the catalogue of species, have kindly furnished material of Connecticut Bryophytes for examination, and have thereby made the report much more complete than it would otherwise have been. To all of these the writers would express their sincere thanks.

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CONTENTS

Page
GENERAL CHARACTERISTICS OF THE BRYOPHYTES, . . . 9
HISTORY OF BRYOLOGY IN CONNECTICUT, ... 25
DISTRIBUTION OF THE BRYOPHYTES IN CONNECTICUT ACCORDING TO ENVIRONMENT, ... 30
ECONOMIC VALUE OF THE BRYOPHYTES, ... 35
CATALOGUE OF CONNECTICUT BRYOPHYTES:
  Marchantiales, . . 38
  Jungermanniales, . 43
  Anthocerotales, . . 75
  Sphagnales, . . 76
  Andreæales, . . 86
  Bryales, . . . 87
SUMMARY, ... 177
BIBLIOGRAPHY OF CONNECTICUT BRYOLOGY, ... 179
INDEX, ... 185

THE BRYOPHYTES OF CONNECTICUT

GENERAL CHARACTERISTICS OF THE BRYOPHYTES

The Bryophytes represent a very clearly defined Class in the Vegetable Kingdom, occupying a position just below the Pteridophytes, which include the Ferns and their allies. They comprise the plants which are properly known as Mosses and Liverworts. They must not be confused, however, with Algæ and Lichens, both of which are sometimes called mosses, although simpler and less definite in organization, nor yet with the more highly developed Club Mosses, which belong to the Pteridophytes. The group is characterized by a clearly defined alternation of generations and by complex sexual organs, both antheridia and archegonia being multicellular, and showing a differentiation into sterile and fertile cells.

The *gametophyte,* or sexual individual, is a green plant, capable of absorption from the outside and therefore able to lead an independent life. It constitutes the plant-body of the Moss or Liverwort as ordinarily understood, and is usually much larger and more conspicuous than the *sporophyte,* or asexual individual. It consists of a dorsi-ventral thallus, usually closely appressed to the substratum, or else of a leafy shoot, the leaves being always destitute of stalks, and usually but a single cell thick throughout the greater part of their extent. Whatever its form the gametophyte exhibits an apical growth, frequently dying at one end while it advances at the other. It develops no true root, as do the higher plants, but clings to the substratum by means of filamentous organs called *rhizoids,* which often play no part in the process of absorption. The antheridia and archegonia are borne on the gametophyte; in monoicous species they arise on the same plant; in dioicous species, on different plants. The *antheridium* consists of a spheroidal or ovoid sac, sometimes stalkless and sometimes borne on a short stalk. The sac is bounded on the outside by a wall composed of a single layer of sterile cells, and the whole interior is occupied by a compact mass of fertile cells, each one of which gives rise to a single male cell, or *sperm*. When the antheridium is mature, it absorbs water and bursts its wall, allowing the sperms to escape and swim away. Each sperm consists of a slender body, and swims by means of two long and delicate cilia attached at one end.

The *archegonium* may also be stalkless or borne on a short stalk, but is more slender than the antheridium. The single female cell, or *egg*, is developed in the swollen basal portion which is called the *venter*, and this is tipped with a somewhat longer cylindrical portion called the *neck*. Both venter and neck are bounded on the outside by a wall composed of sterile cells. The egg represents the lowest of a row of cells enclosed by this wall, the remaining cells, which fill the neck and a portion of the venter as well, being known as *canal cells*. When the mature archegonium absorbs water, the neck opens at the tip, and the canal cells break down into a mass of slime, some of which escapes through the opening. In this way a free canal is formed which leads from the outside into the venter, and at the base of this canal the egg becomes rounded off. The sperms, attracted by the protoplasmic slime exuding from the archegonium, swim toward it, and one of them makes its way down the canal, uniting with the egg and thus completing the process of fertilization.

As soon as this has been accomplished, the fertilized egg, without escaping from the archegonium, begins at once to develop into the sporophyte, which remains in contact with the gametophyte during its entire life, without being organically connected with it. The chief function of the sporophyte is to develop asexual *spores*, but some of its cells invariably remain sterile and perform functions not connected with reproduction. In the more primitive Bryophytes it is practically destitute of chlorophyll, and is therefore wholly dependent upon the gametophyte for food, living as a parasite upon it. In the higher forms it develops green cells, capable of performing photosynthesis, and probably derives nothing from the gametophyte except solutions of inorganic substances. In such cases the parasitism is only partial. The portion of the sporophyte which remains in close contact with the gametophyte usually forms a special absorbing organ, or *foot*. This organ, however, never acquires the power of absorbing from the outside, so that the sporophyte is never able to exist as an entirely independent plant.

The spores are borne within a closed case, or *capsule*, which constitutes the so-called *fruit* in the Bryophytes. The capsule is bounded on the outside by a sterile wall, and the space in which the spores are developed is known as the *spore cavity*. When the spores are mature, they lie loose within the cavity, and are set free by the rupturing of the wall. In the majority of cases the capsule is borne on a slender cylindrical *stalk*, which connects it with the foot and at the same time lifts it above the gametophyte.

When the fertilized egg begins to divide, the sterile cells which form the wall of the venter also undergo divisions and develop into a protective covering for the young sporophyte. This covering is called the *calyptra*, and for a considerable period its growth keeps pace with that of the sporophyte. Sooner or later, however, it ceases to enlarge and is eventually ruptured by the swelling capsule. The neck of the fertilized archegonium plays no part in the development of the calyptra, but can frequently be detected at its apex in a shriveled condition. In a few specialized genera a true calyptra is not formed.

Upon germination a spore at first gives rise to an embryonic structure, or *protonema*, upon which the characteristic gametophyte afterwards develops. The protonema is sometimes very short-lived, but in many species persists for a considerable period. It usually consists of a copiously branched filamentous structure, but it may be composed of a flat layer of cells or of a small solid cell mass. In some cases the protonema is represented by a very few cells arranged in a simple cell row and is then scarcely distinguishable.

Although very few Bryophytes are truly aquatic, it has been shown that the presence of water is necessary for the process of fertilization. It not only enables the antheridia and archegonia to open, but it also affords a medium in which the motile sperms can swim. The water is usually supplied by rain, but, if no rain falls at the proper time, the antheridia and archegonia gradually shrivel away and sporophytes fail to be developed. Any failure to effect fertilization is of course a menace to the further existence of a species, and the probability of failure is especially great in the case of dioicous species, where the male and female plants are often far apart, necessitating a long journey for the sperms. To a certain extent the danger is overcome by the development of organs of vegetative reproduction, known as *gemmæ* or *propagula.* The simplest of these consist of single cells or of small groups of cells without definite form. They easily become separated from the parent plant and develop into new individuals if supplied with the proper conditions. In many cases the reproductive bodies are more complex and already show, even before they fall away, some indication of the thallus or leafy shoot into which they will develop. Certain species reproduce largely if not entirely by means of these vegetative bodies.

It is customary to divide the Bryophytes into two subclasses, known respectively as the Hepaticæ, or Liverworts, and the Musci, or Mosses. This classification, however, as Underwood and others have pointed out, does not altogether represent the facts, and it is more convenient, if not more natural, to divide the group into the following six orders, which may be considered as approximately equal in rank: — I. MARCHANTIALES; II. JUNGERMANNIALES; III. ANTHOCEROTALES; IV. SPHAGNALES; V. ANDREÆALES; VI. BRYALES. By adopting this course it becomes much more practicable to assign definite characters to the various subdivisions. Of these six orders the first three comprise the Hepaticæ and the last three the Musci, as limited by the majority of botanical works; and it is still often convenient to employ the terms in this general sense.

THE MARCHANTIALES

The present order includes about half of the thalloid Bryophytes known from Connecticut, and most of the species are large and conspicuous. Two are normally aquatic, floating in ponds or slow streams; the others are all terrestrial, and even the aquatic species tend to become terrestrial through the drying up of the water in which they live. Except in the aquatic forms the thallus clings closely to the substratum, sometimes so closely that it cannot be separated without injury. It develops two types of rhizoids, both of which represent simple outgrowths from cells. In one type the walls are thin throughout; in the other they bear scattered local thickenings in the form of short rods which project into the lumen. The rhizoids are all short-lived, and those of the first type simply anchor the plant to the substratum; those of the second type, however, by means of capillarity, play a certain part in the process of absorption. In addition to the rhizoids, the thallus often bears longitudinal rows of delicate scales on the lower surface. These are developed very early and arch up over the growing point, thus protecting it from injury.

The thallus is more or less differentiated, and always shows, at least in certain stages of development, a distinct epidermis, beneath which the photosynthetic tissue is situated. The latter consists of green cells loosely arranged with intercellular spaces containing air among them. In the higher forms these cells are in distinct air-chambers, which communicate with the outside air by means of pores in the epidermis. In the lower forms they simply line the intercellular spaces, and the communication with the outside air is often less definite. The Marchantiales are divided into two families, the Ricciaceæ and the Marchantiaceæ, which differ from each other most markedly in the structure of the sporophyte.

The Ricciaceæ include both aquatic and terrestrial species, and are usually smaller than the Marchantiaceæ. The terrestrial forms grow in old fields, along damp roadsides, and on the muddy borders of ponds. The thallus, which rarely attains a length of fifteen millimeters, forks repeatedly in one plane, thus giving rise to a characteristic rosette. All the New England species are annual, developing their sporophytes in the autumn. The aquatic Ricciaceæ are larger than the others, and rarely produce sporophytes, the tips of the thallus being able to survive the winter. When they become terrestrial, they sometimes assume an appearance very different from their normal aquatic state.

The archegonia in the Ricciaceæ are so deeply immersed in the thallus that only their necks protrude above the surface. In consequence of this fact the sporophytes begin their development beneath the surface, and they retain this position until they are mature. The sporophyte is much simpler than in any of the other Bryophytes and consists of a spherical capsule only, which absorbs through its entire surface. The capsule contains nothing but spores, and these are at first enclosed by the capsule wall, consisting of a single layer of cells. As development advances, this wall gradually disappears, and the mature spores lie free within the calyptra. They are set free by the decay of the surrounding tissues of the gametophyte, and are dispersed largely through the agency of water.

The Marchantiaceæ are all terrestrial, some of them growing on shaded rocks or in their crevices and others on damp or wet earth. The thallus is more highly differentiated than in the Ricciaceæ, and in the larger species sometimes reaches a length of twenty centimeters or more and a width of ten millimeters. The branching is normally but not invariably by forking. The New England species are more or less perennial but some of them develop sporophytes during the first year.

Except in a few genera which do not occur in the eastern United States, the archegonia are borne on modified branches or outgrowths of the thallus known as *carpocephala*. These consist of two parts, an apical discoid or conical expansion and a basal cylindrical stalk. Sooner or later the stalk elongates and carries the expansion, to which it is attached in a peltate manner, high up above the surface of the thallus. As the sporophytes mature, they extend horizontally from the margin of the expanded portion or else hang downward from its lower surface. They are more complex than in the Ricciaceæ and not only develop a capsule with a persistent wall but also a foot and a short stalk, although the line of demarcation between the two latter organs is not always clearly defined. The spore cavity contains not only the spores but also a large number of peculiar bodies known as *elaters,* each of which consists of a long and slender cell with a thin cell wall, strengthened on the inside by one or more spiral bands of thickening. When the spores become mature, the stalk elongates slightly, the calyptra is ruptured, and the wall bursts, either by means of irregular valves extending backward from the apex, or else by a circular line, which leaves the basal portion of the capsule wall in the form of a cup. As the spores and elaters become dry, the latter through their elasticity stretch out and separate the spores. In this way the contents of the capsule form a loose cottony mass, which can be easily carried away by the wind. In certain genera the gametophyte develops a special protective organ for the sporophyte outside the calyptra. This is usually in the form of a hollow tube or sheath open at the tip, and may be called a *pseudoperianth,* to distinguish it from a very similar organ found in many of the leafy Jungermanniales.

THE JUNGERMANNIALES

Both thalloid and leafy forms are here represented. All are characterized by a slight degree of cell differentiation and by a lack of intercellular spaces, even among the green cells. The rhizoids are all essentially alike and agree with the first type described for the Marchantiales. Their only function is that of anchorage, and to perform this more efficiently they frequently become lobed or branched at the extremity. In many of the genera absorption seems to be carried on by all the surface cells.

With the exception of a very few primitive types which are not known from New England, the sporophyte is practically uniform throughout the entire order. It consists of a distinct foot, a stalk, and a capsule, and it remains enclosed within the calyptra until the spores are mature. The stalk consists of strongly flattened cells arranged in longitudinal rows, and the capsule, as in the Marchantiaceæ, contains both spores and elaters. When the spores are ready to be disseminated, the stalk elongates rapidly through the lengthening of its individual cells and thus forces the capsule through the calyptra. The latter is thus irregularly ruptured but continues to enclose the base of the stalk. The capsule now raised on its stalk soon splits its wall, usually into four valves, the lines of dehiscence extending from the apex to or toward the base. The spores are scattered in much the same way as in the Marchantiaceæ, although the elaters sometimes play a more active part in their dispersal. The Jungermanniales are also divided into two families, the Metzgeriaceæ and the Jungermanniaceæ, the most important differences in this case being in the gametophytes.

In most of the Metzgeriaceæ the gametophyte is a thallus, but a few of the genera show a more or less complete differentiation into stem and leaves. The plants are usually composed of parenchyma throughout, but a few thalloid species develop a very primitive conducting tissue composed of elongated cells with lignified walls. The archegonia are borne on the upper surface of the gametophyte or of a special branch, and do not directly terminate its growth. In many cases a protective structure is developed outside the calyptra, and this sometimes assumes the form of a pseudoperianth as in the Marchantiaceæ.

The Jungermanniaceæ are sometimes called Scale Mosses, the gametophyte being invariably a leafy stem. Most of the species are prostrate, and the plants show a distinct dorsiventrality, even when ascending or erect. The leaves are normally alternate and arranged in three ranks, two of which are turned toward the light and the third toward the substratum. The leaves of this third rank are called *underleaves,* and are usually much smaller than the others and different from them in form. Sometimes they are so much reduced in size that they can scarcely be demonstrated, and in a few genera they are absent altogether. The two ranks of large leaves usually spread out in such a way that the whole shoot acquires a strongly flattened appearance, very characteristic of the family as a whole.

The leaves as a rule exhibit no cell differentiation whatever, and are invariably destitute of midribs. They show, however, a great deal of variation in form and in the way in which they are attached to the stem. They are sometimes undivided, sometimes variously toothed, lobed, or deeply cleft; they are sometimes developed in one plane, sometimes variously folded; they are sometimes attached by a continuous line, sometimes by two lines which meet at an angle. In a few genera the leaves develop peculiar organs, known as *water sacs,* in which water may be temporarily retained. The branches sometimes show a differentiation into those which bear normal leaves and those which assume a flagelliform appearance, the leaves in the latter case being strongly reduced or even absent altogether. The flagelliform branches frequently perform the function of holding the plant more firmly in place, and are confined to certain species and genera.

The archegonia are borne at the apices of stems or of special branches and stop their further elongation. The leaves and underleaves which develop in the immediate vicinity of the archegonia are more or less modified, and are designated *bracts* and *bracteoles* respectively. Taken together they constitute the *involucre.* This often surrounds the developing sporophyte and helps protect it. In the majority of the genera, however, the gametophyte develops a special protecting organ. This usually consists of a hollow tube, open at the top and enclosed by the involucre; and, since this tube is theoretically formed by the coalescence of modified leaves, it is called a *perianth,* although it is not homologous with the perianth in flowering plants. In a few cases the fertile branch takes on a peculiar growth as the result of fertilization, and forms a hollow cup around the sporophyte. This is known as a *perigynium,* and may be either pendent or erect. In the latter case the uppermost bracts and bracteoles are often carried up on the outside. In very rare instances the young sporophyte penetrates the tip of the fertile branch, which serves directly as a protecting organ without undergoing marked modifications. Under these circumstances the calyptra itself often fails to develop.

The Jungermanniales are about nine times as numerous in Connecticut as the Marchantiales. Less than one seventh of the recorded species are Metzgeriaceæ, the others being all Jungermanniaceæ. A few are more or less aquatic, either floating on the surface of the water or attached to submerged rocks or stones. A few others are to be found in bogs or swamps. The remainder grow on rocks, on banks, on earth, or on the trunks of trees, usually in damp and shaded localities. They vary greatly in size, a few being hardly perceptible to the naked eye, while others attain a length of ten centimeters or more. The sporophytes, with few exceptions, reach maturity in the spring.

THE ANTHOCEROTALES

The Anthocerotales are sometimes called Hornworts or Horned Liverworts, and embrace the single family Anthocerotaceæ. This includes only three recognized genera, two of which are represented in Connecticut. In spite of its small size, the order is of especial interest to the student of plant morphology and evolution, because it probably represents, more closely than any of the other existing Bryophytes, the ancestors of the Pteridophytes. The northern species are all annuals, and make their appearance in May or June in wet pastures, along roadsides, or on wet rocks. Each gametophyte has several sporophytes growing from it; they begin to develop late in the summer, and continue in many cases until the plants are killed by the frost.

The gametophyte is a thallus, sometimes bearing irregular and crispate outgrowths on the upper surface or along the margin, but never definitely divided into stem and leaves. The thallus branches by forking, but the forks are so close together that it soon assumes the form of a fleshy circular disc with many growing points scattered along the margin. It apparently absorbs throughout its entire surface, and is attached to the soil by means of thin-walled rhizoids, similar to those of the first type in the Marchantiales. The thallus shows but a slight degree of cell differentiation, but some of the species develop minute intercellular spaces, which, however, may contain slime as well as air. The green cells are characterized by the presence of a single large chloroplast in each. This is in the form of a plate with thin and irregular margins, lying close to the cell wall. Cells of this type are found nowhere else among the Bryophytes, and probably represent a primitive characteristic, indicative perhaps of a distant relationship with the green Algæ. In all the other orders each green cell contains a number of small, disc-like chloroplasts, and agrees in structure with the green cells of the higher plants. Taking it as a whole, the gametophyte in the Anthocerotales is even more primitive than in either the Ricciaceæ or Metzgeriaceæ. Even the archegonia, although showing essentially the same structure as in the other Bryophytes, are imbedded in the thallus so that only the tip of the neck protrudes. For this reason no true calyptra is developed, the function of this organ being assumed by a tubular outgrowth of the gametophyte, which encloses the base of the sporophyte.

Although the gametophyte in the present order is so simple, the sporophyte shows a high degree of complexity when compared with the preceding groups. It consists of two principal parts, a spherical or flattened foot, and a long and slender capsule, tapering somewhat toward the apex. No true stalk is formed, the base of the capsule passing imperceptibly into an undifferentiated region composed of embryonic cells. These continue to give rise to new cells, which gradually become differentiated into the permanent tissues of the capsule. The presence of these embryonic cells enables the sporophyte to grow indefinitely, a power which no other sporophytes possess until the Pteridophytes are reached. On account of the basal position of the growing region, the apex of the capsule is the first part to mature, and all stages of development are to be observed in passing from the apex toward the base. The cross section is approximately circular, but sometimes two longitudinal grooves are formed, showing where the wall will eventually split. The latter is relatively much thicker than in the preceding orders, the spore cavity being distinctly smaller. In the higher forms the wall is bounded on the outside by a distinct epidermis, with stomata, and this encloses several layers of green cells separated by minute air spaces. The wall therefore represents a photosynthetic tissue, comparable to the mesophyll in the higher plants. In the lower forms the wall is less highly differentiated and no stomata are developed. The center of the capsule is occupied by a slender but more or less clearly defined *columella* composed of sterile cells, and the spore cavity is in the form of a hollow cylinder between the columella and the capsule wall. The cavity is continuous over the tip of the columella at the apex of the capsule. It contains both spores and elaters; but the latter are irregularly and poorly developed in northern species, and do not develop local thickenings in their walls. When the apex of the capsule is mature, the wall splits into two valves, the splits gradually extending downward as the development proceeds. The valves, as they separate, soon become dry and black, and the columella appears like a fine hair projecting from the open capsule. The gametophyte covered over with sporophytes often presents the appearance of a tuft of fine grass.

The structure of the sporophyte in the Anthocerotales is so peculiar that Howe separated the order from the Hepaticæ and made of it a distinct subclass, to which he gave the name Anthocerotes. He therefore divided the Bryophytes into three subclasses; Hepaticæ, Anthocerotes, and Musci. In this procedure he is followed, provisionally at least, by Campbell, but European writers continue to use the term Hepaticæ in the old sense.

THE SPHAGNALES

The Sphagnales or Peat Mosses comprise the single genus Sphagnum. They are well represented in Connecticut, and include some of our largest and most conspicuous Bryophytes. The peat mosses are occasionally found on wet rocks or banks, but are most at home in bogs, where they sometimes grow submerged but more frequently rise above the surface of the water. In favorable localities they form dense and extensive colonies. Under these circumstances the stems are upright and afford one another mutual support. No rhizoids are developed except when the plants are very young. The branching is always monopodial, the branches arising in fascicles of from three to eight. The fascicles are numerous, and the branches appear densely crowded at the tips of the plants because the elongation of the stem is at first very slow. In older parts the fascicles become more separated. The branches are of three types: — spreading branches, which remain simple and are limited in growth; pendent branches, which also remain simple and limited in growth, but which grow downward close to the stem and form a sort of loose covering around it; erect branches, which are unlimited in growth and give rise to spreading and pendent branches of their own. These erect branches are only occasionally produced, and, since they repeat the stem in all respects, apparently arise by forking.

The leaves are arranged in five longitudinal rows, although this fact is sometimes difficult to demonstrate. They are destitute of midribs, but show a remarkable differentiation into two kinds of cells: — green cells, which remain alive for a long time; and colorless cells, which soon lose their living contents and become empty. In the leaves of the spreading branches the green cells are united in such a way that they form a loose network, each mesh of which is filled with a single large colorless cell. The latter is characterized by a thin wall, usually with band-like thickenings on the inside which keep it from collapsing, and by holes or pores which place its cavity in direct communication with the outside. The stems and branches are usually covered over on the outside by a cortex composed of similar colorless cells; within this is a distinct zone of sclerenchyma enclosing a central pith. The tufted habit of the peat mosses, their upright stems covered with pendent branches, and their porous hyaline cells, account for the ease with which they suck up and retain water. The process is largely due to capillarity.

The archegonia are borne at the tips of branches, and limit their growth just as in the Jungermanniaceæ. The sporophyte consists of a spherical capsule and a broad foot with a deep constriction between them. No true stalk is developed. The calyptra persists until the spores are mature, and is then irregularly ruptured by the dehiscence of the capsule. The latter while still immature contains a large columella in the form of a hemisphere. This is covered over at the apex by the small spore cavity in much the same way as in the Anthocerotales, but the cavity contains spores only. The wall of the capsule is several cells thick, the outer layer forming a distinct epidermis. Some of the inner cells contain chloroplasts, but there are no intercellular spaces among them, and the epidermis develops no effective stomata, so that the wall can hardly serve as a very useful photosynthetic tissue. When the spores are mature, the upper part of the archegonial branch elongates rapidly, thus simulating a stalk, and the capsule opens by means of a circular split in the wall, which cuts off a cap-like lid. As the drying of the capsule proceeds, the pressure in the interior increases, until a sudden liberation takes place which shoots out the spores together with the lid to a distance of ten centimeters or more. The ripening and scattering of the spores occurs in the summer months.

THE ANDREÆALES

The present order contains the single genus Andreæa, separated from the Bryales on account of the peculiar structure of the capsule. The species are all small, and grow in tufts on siliceous rocks, usually in mountainous regions. The gametophyte consists of an upright and sparingly branched stem bearing crowded leaves in the three-eighths arrangement. Except for the midrib, which occurs in certain species only, the leaves show no cell differentiation.

The sporophyte bears a certain resemblance to that of Sphagnum. It consists of an oval capsule and a well-developed foot, but no true stalk is formed. The calyptra is very delicate and is ruptured long before the spores are mature; sometimes it is carried up on the tip of the capsule, sometimes it remains at the base and the capsule protrudes through it, very much as in the Jungermanniaceæ. The capsule contains a definite columella, arched over by the spore cavity in the form of a hollow cylinder, and is bounded on the outside by a wall several cells thick. The wall has a distinct epidermis without stomata, and is probably not very efficient as a photosynthetic tissue, although some of its cells contain chloroplasts. When the spores are mature, the tip of the archegonial branch elongates rapidly, assuming the function of a stalk, and the wall of the capsule splits along four longitudinal lines. These do not extend, however, to the apex, but they are sufficient to expose the spores and to allow them to be scattered by the wind. The capsule usually reaches maturity in the spring or early summer.

THE BRYALES

The Bryales, or True Mosses, constitute the largest order of the Bryophytes, and include about two thirds of the Connecticut species. The gametophyte varies greatly in size, being sometimes only one millimeter long and sometimes attaining a length of ten centimeters or more. It always consists of a leafy shoot, the leaves being usually arranged in more than three longitudinal rows. The leaves vary in form from linear to orbicular, and, although they are sometimes toothed or even ciliate on the margins, they are never deeply lobed or divided as in some of the Jungermanniaceæ. Except for the midrib, which may or may not be present, the leaves very rarely show any differentiation in their cells. In prostrate species the plants sometimes acquire a dorsi-ventral appearance, and a slight differentiation in the leaves is occasionally to be observed. These peculiarities, however, are never so clearly marked as in the Jungermanniaceæ, and there is little danger of confusing the True Mosses with the Scale Mosses. The branching in the Bryales is always of the monopodial type, and is often distinctly pinnate. In the lower forms the stem presents a simple and uniform structure, but in some of the higher genera it shows a distinct cell differentiation into storage, strengthening, and conducting tissues, and the same is sometimes true of the midribs of the leaves.

In the majority of cases the sporophyte shows a distinct foot, a firm stalk, which early becomes elongated, and a highly complex capsule. The calyptra at first keeps pace with the lengthening sporophyte but soon stops growing and becomes ruptured. In nearly every case the line of rupture is near the base, and the calyptra is carried up on the tip of the sporophyte. As the capsule gradually enlarges, the calyptra, which is now cut off from its source of food-supply, dries up and splits in one or more places, so that it frequently falls away long before the spores are mature. The spore cavity occupies a relatively small space in an immature capsule, and is in the form of a hollow cylinder open at both ends, differing in this respect from all the preceding Bryophytes. It encloses a massive columella, and is bounded by a thick wall, which, in most species, represents an efficient photosynthetic tissue. The outer cell layer of the wall forms an epidermis with stomata, the latter being usually restricted to the base of the capsule. The green cells are usually arranged in two more or less definite layers, one surrounding the spore cavity and the other lining the epidermis. These two layers are separated by a large air space in the form of a hollow cylinder. Stretching across the air space from one green layer to the other are rows of green cells, which play a part in holding the central portion of the capsule in place. Of course the stomata afford a communication between the air space and the outside air.

As the spores mature, the photosynthetic tissue breaks down, the columella shrivels, and the spores eventually lie loose in an enlarged cavity, bounded by little more than the epidermal layer of the capsule wall. In a few of the simpler genera the capsule bursts irregularly at maturity. In the majority of cases, however, it splits by a circular line in the upper part, which cuts off an apical portion, or *lid,* from the capsule proper. Sometimes the region of splitting is marked by a row of modified epidermal cells, called an *annulus,* but this is not always developed. The walls of the annular cells have the power of absorbing water readily and swelling, thus forcing the lid to separate. After the lid has fallen away, the mouth of the capsule usually appears fringed with a circle of pointed *teeth* called a *peristome,* and in many genera two peristomes are developed, an inner and an outer. The inner peristome is always more delicate than the outer, and its divisions, when present, are called *segments,* instead of teeth. The segments are sometimes separated from one another by one or more delicate hair-like structures known as *cilia.* The peristome plays a peculiar part in the scattering of the spores; in moist weather the teeth come together and close the mouth of the capsule; in dry weather they separate and allow the wind to scatter the spores. Although the description just given will apply to the majority of cases, the structure of the capsule may be much simpler or even more complex than indicated. Taking the Bryales as a whole, the sporophyte shows the highest type of development to be found in the Bryophytes. It does not, however, show unlimited growth, the entire capsule maturing at the same time, and in this respect it is surpassed by the Anthocerotales.

The Bryales are divided by Brotherus into more than forty families, about half of which are represented in Connecticut. These are based on the general habit and structure of the gametophyte and on the peculiarities of the capsule, many of the most important characters being derived from the peristome. The species flourish best in moist and shaded localities, and are often found in company with the Jungermanniales. Quite a number of them, however, are able to live in much drier localities, such as exposed rocks and sandy fields. Of the Connecticut species a few are annual but the majority are perennial. Most of them mature their spores in the fall or early winter, and the others in the spring or early summer. During the hot days of July, August, and September, many of the mosses become completely dried up, and their vegetative activities are interrupted. Even under favorable conditions for growth it is very unusual to find perfect capsules at this season of the year.

HISTORY OF BRYOLOGY IN CONNECTICUT

The first systematic collections of Bryophytes in Connecticut were made by Daniel C. Eaton, Professor of Botany in Yale University from 1864 until 1895, the year of his death. Professor Eaton was a member of the class of 1857, Yale College, and began his bryological studies while still an undergraduate. From the very outset he enjoyed the privilege of corresponding with W. S. Sullivant, of Columbus, Ohio, at that time the leading authority on North American Mosses and Hepatics, and this correspondence was continued until Sullivant's death in 1864. During this period many doubtful Connecticut specimens were sent for comment or determination, among them being a sterile Fontinalis collected near New Haven. This specimen is apparently the first Connecticut Bryophyte which is definitely mentioned in the literature. It was first referred to *F. biformis* Sulliv., and is listed under this name in the " Musci and Hepaticæ of the United States," originally written by Sullivant for the second edition of Gray's " Manual of Botany," published in 1856, but reprinted the same year as a separate work under the above title. *F. biformis* was based on Ohio specimens, and according to our present knowledge is restricted to the region of the Great Lakes. It was soon discovered therefore that the Connecticut material had been incorrectly determined. Sullivant hastened to call attention to this fact in the " Additions and Corrections " to his " Musci and Hepaticæ," which appear in the separate edition, but are not included in the "Manual." The Connecticut Fontinalis is here transferred to *F. Novæ Angliæ* Sulliv., a species proposed as new and based on material from several stations in southern New England. Eight years afterward, in his "Icones Muscorum," Sullivant accredited to Connecticut a second species of Moss, *Grimmia Olneyi* Sulliv., originally described from Rhode Island material.

About the time of Sullivant's death, Professor Eaton began a correspondence with the late C. F. Austin, of Closter, New Jersey, who published many short papers on Bryophytes between 1863 and 1880. Austin was even more interested in the Hepaticæ than in the Mosses, and much of our present knowledge of this group of plants is based on his studies. In 1873 he issued his "Hepaticæ Boreali-Americanæ," the first set of exsiccatæ devoted exclusively to North American Hepatics. For this publication Professor Eaton supplied a portion of the material distributed under No. 115, as *Aneura pinnatifida* Nees, now known as *Riccardia sinuata* (Dicks.) Trevis., and this is apparently the first published reference to a Connecticut Hepatic, the specimens being recorded from near New Haven.

With the exception of these scattered notes nothing of importance seems to have been published on Connecticut Bryophytes until 1878, although a large collection was gradually being accumulated. In this year the Berzelius Society of the Sheffield Scientific School printed "A Catalogue of the Flowering Plants and Higher Cryptogams growing without cultivation within thirty miles of Yale College." This catalogue includes not only the Acrogens, or Pteridophytes, but also the Anogens, or Bryophytes, differing in this respect from the majority of local lists. The account of the Anogens, in which 170 Mosses and 54 Hepatics are enumerated, was prepared by Professor Eaton, and forms one of his most important contributions to the literature of bryology. The common and widely distributed species are listed by name only, but definite stations are given for the rarer species, and frequently the names of the collectors also are mentioned. Although Professor Eaton's own name appears but rarely, it is evident from his herbarium that he had found most of the species listed. Mr. J. A. Allen is quoted for a number of the most interesting species, and Professor O. D. Allen, Mr. A. Barron, Mr. E. E. Brewster, Mr. W. T. Browne, Mr. N. Coleman, Dr. F. W. Hall, Dr. G. R. Kleeberger, Mr. F. N. Pease, Mr. R. Veitch, and Mr. A. H. Young are also mentioned as collectors. The Berzelius List has of course served as a basis for subsequent work on Connecticut Bryophytes, but no publication on the entire group, dealing with either the whole or a part of the state, has since appeared.

During the last thirty years, however, the Mosses and Hepatics have by no means been neglected, and many additional species have been detected within the state. Several of these were found by Professor Eaton himself, who continued his active interest in bryology throughout his life. Others were collected by Mr. J. A. Allen, including a number of rare and minute species which have not been rediscovered by later observers. Still others were found by more recent students of Professor Eaton, Mr. E. B. Harger, Professor W. A. Setchell, and Dr. C. B. Graves being among the number. During the last decade some of the most interesting additions have been made by Mrs. Josephine D. Lowe and Miss Annie Lorenz, and the authors of the present catalogue have also had a share in swelling the list of Connecticut Bryophytes.

In spite of this active collecting very little has been published on the true Mosses (Bryales) of Connecticut since the Berzelius List. A search through the scattered literature has brought to light less than a dozen species which are actually additions. Among the more important of these are the following: — *Thuidium Alleni* Aust., described from sterile specimens collected by Mr. J. A. Allen in Beaver Meadows, near New Haven; the rare *Claopodium pellucinerve* (Mitt.) Best, collected by Mrs. Lowe at Noroton in the town of Darien, and reported upon by Miss Harriet Wheeler; and *Anacamptodon splachnoides* Brid., first recorded by Mrs. Lowe from Burnside, in the town of East Hartford. As the present report shows, the number of known species is now 245. This does not include the two species of Andreæa discovered by Mr. J. A. Allen, which of course belong to a different natural order (Andreæales). For the "Musci Americæ Septentrionalis

Exsiccati," issued by Renauld and Cardot during the last fifteen years, Professor Eaton supplied a number of species from Connecticut, and these will be especially indicated in the list which follows.

The Peat Mosses (Sphagnales) and the Hepaticæ have received rather more attention than the True Mosses, and the majority of the additions which have been made in these two groups have already been recorded. In the Berzelius List only three species of Sphagnum are included. About 1890, however, Professor Eaton and the senior writer began to collect these interesting plants systematically, and to submit specimens to Dr. C. Warnstorf, then of Neuruppin, Germany, for determination. In this way the number of known species was markedly increased. In 1892 Warnstorf described as new, under the name *S. dasyphyllum,* a species from East Haven, which is still known from this locality only. In 1893 Professor Eaton published his "Check-List of North American Sphagna," indicating the geographical distribution of each species, so far as known at that time. Although Connecticut is included in several of the wider ranges, only five species are definitely recorded from the state, all of these being additions to the Berzelius Catalogue. The check-list was prepared for the convenience and guidance of Professor Eaton and Mr. Edwin Faxon, of Malden, Massachusetts, who were collecting sets of North American species for distribution. These sets were issued in 1896 by Dr. George F. Eaton, under the title "Sphagna Boreali-Americana Exsiccata," and constitute the only published exsiccatæ devoted exclusively to North American Peat Mosses. They include twenty-nine numbers from Connecticut, representing fourteen species. Three species from the state had already been distributed by Warnstorf, in the fourth series of his "Europaeische Torfmoose." In 1906 Andrews listed nineteen species of Sphagnum from Connecticut, and twelve additional species have been recently determined by Warnstorf from Connecticut specimens, so that thirty-one species in all are now known.

Since the publication of the Berzelius List the number of known species of Hepaticæ within the state has been almost doubled. The seven following species, occurring in Connecticut, have been described as new: *Calypogeia tenuis* (Aust.) Evans, *Diplophylleia apiculata* Evans, *Frullania Brittoniæ* Evans, *Jungermannia Novæ-Cæsareæ* Evans, *Lepidozia sphagnicola* Evans, *L. sylvatica* Evans, and *Plagiochila Sullivantii* Gottsche. Unfortunately two of these have since been reduced to synonymy, *Jungermannia Novæ-Cæsareæ* being now considered a form of *Lophozia marchica* (Nees) Steph., and *Lepidozia sphagnicola* being included under *L. setacea* (Web.) Mitt. Many other additions to the hepatic flora of the state have been recorded in a series of "Notes on New England Hepaticæ," and in a "Preliminary List," both published by the senior writer in Rhodora. It should be noted, however, that the earliest references to *Riccia arvensis* Aust. and *Mylia anomala* (Hook.) S. F. Gray are to be found in the writings of Professor L. M. Underwood, and that Dr. M. A. Howe was the first to report *Porella rivularis* (Nees) Trevis. and *Anthoceros punctatus* L. Fifteen species of Connecticut Hepaticæ and Anthocerotes have been distributed in Underwood and Cook's "Hepaticæ Americanæ," all of which are indicated below. Several other species are included in the first two decades of the "American Hepaticæ," recently issued by Miss Caroline C. Haynes.

The bryophytic flora of Connecticut is perhaps as well known as that of any equal area in North America, but the region has not yet been so intensively studied as certain parts of Europe. This is due partly to the fact that here, as in other groups, common species have been largely neglected by collectors, and are therefore less fully represented in our herbaria than some of the rarer and more local species. The attempt has been made of late to collect even the commonest species more systematically, but much still remains to be done, and many parts of the state still remain to be explored before our knowledge can be considered at all complete. This is especially true of the towns in the eastern and northeastern counties.

DISTRIBUTION OF THE BRYOPHYTES IN CONNECTICUT ACCORDING TO ENVIRONMENT

Even to the casual observer it is evident that the character of the vegetation which clothes the surface of the earth varies greatly under different conditions. There is a marked contrast, for example, between the impenetrable tangle of a tropical jungle with its wide diversity of species, and the northern spruce forests which are relatively open and are made up of comparatively few species. The vegetation at the summit of Mount Washington is scant and limited to shrubby and herbaceous plants, while the valleys but a few thousand feet below are heavily wooded. Ordinary land plants differ strikingly in appearance from seaweeds and other submerged aquatics.

These are perhaps extreme illustrations, but innumerable examples of this adaptation to environments which are less diverse may be seen everywhere. The vegetation in an open field presents a decided contrast to that of a pine grove but a few hundred yards distant, while the flora in a bog is totally different from that in a meadow.

It may be stated as a general rule that every plant is best adapted to a peculiar environment, and that for every species there are certain more or less well defined limits outside of which it cannot exist. What is true of the higher plants applies even more forcibly to the Mosses and Hepatics, for, as Lesquereux remarks, " these humble and apparently useless beings have their geological and lithological preferences far better marked than any other kind of vegetable."*

The factors which produce this environment and determine these limits are numerous, but the following are the most important:

I. Latitude.
II. Altitude.
III. Character of the substratum.
IV. Intensity of the light.
V. Water supply.

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*Quoted by Mohr: Plant Life of Alabama. Contr. U. S. Nat. Herb., 6: 292. 1901.

In treating an area such as the continent of North America, where all gradations from an arctic to a tropical climate are encountered, the first of these factors bears an important relationship to the character of the vegetation. Many Bryophytes are exclusively northern in their range, while others are restricted to tropical regions. A comparatively small number are found from the arctic regions to the equator. In considering the Mosses and Hepatics of Connecticut, however, latitude is of relatively little importance.

In the same way the second factor may be disregarded, since nowhere in the state are the differences in altitude sufficient to produce any appreciable climatic effect.

To a certain extent the nature of the substratum determines the character of the bryophytic flora, and various societies might be defined from this point of view, as, for example, the following: — species growing on rocks; species growing on soil; species growing on living trees; species growing on dead trees, rotten wood, etc. Yet the boundaries between such societies are often vague, since many species flourish equally well on a variety of substrata.

Except in the northwestern part of Connecticut, it is probable that the actual chemical composition of the rocks and soil has very little direct effect upon the character of the vegetation. Indirectly, however, the structure of the underlying rocks is an important factor, as may be seen by considering the geography of the state.

"The state of Connecticut is naturally divided into three areas, the Eastern Highland, the Western Highland, and the Central Lowland. The Central Lowland may be further divided into a central range of hills and an eastern and a western valley."* The sedimentaries in the valleys with the overlying drift tend to produce a more or less level surface, which is interrupted only by a few ravines and by occasional bogs. For the most part this area is under cultivation, but, although favorable for agriculture, it does not present conditions conducive to an extensive bryophytic flora. In marked contrast to this uniform area are the trap ridges which rise abruptly to a height of several hundred feet above the surrounding plain. Geologically, these ridges are a part of the Central Lowland. From an ecological standpoint, however, they conform with the Highlands. The Eastern and Western Highlands are made up for the most part of a complex series of crystalline rocks — gneisses, schists, and granites. The forces of erosion, acting on these, have produced an uneven and rugged topography. Like the trap ridges, this region is well wooded, and, while on the whole unsuitable for agriculture, it exhibits a diversity of conditions, and is characterized by a rich bryophytic flora.

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*Rice and Gregory: Manual of the Geology of Connecticut. Conn. Geol. & Nat. Hist. Surv., Bull. 6, p. 17. 1906.

From a bryological standpoint, the most interesting isolated formation in the state is the Stockbridge limestone, which covers the greater part of the towns of Salisbury and Canaan, extending southward through the Housatonic Valley more or less continuously to Ridgefield. A few species grow in this region which have been collected nowhere else in the state, viz.:

Lophozia Muelleri
Barbula fallax
Thuidium abietinum
Amblystegiella confervoides
Amblystegium noterophilum
Cratoneuron filicinum

Other species occur here which, although characteristic of limestone regions, are found in other localities growing on serpentine or other rocks, e. g.:

Preissia quadrata
Frullania riparia
Fissidens cristatus
Sœlania glaucescens
Hymenostylium curvirostre
Myurella gracilis
Chrysohypnum stellatum

The distribution of the Bryophytes is somewhat restricted and frequently the habit of the individual plant greatly modified by differences of light and shade. In a general way two rather broadly defined classes may be recognized: light-loving, and shade-loving Bryophytes. In the first of these classes may be placed such species as —

Riccia arvensis
Frullania eboracensis
Anthoceros levis
Tortula papillosa
Bryum argenteum
Thelia Lescurii

In the latter and by far the larger group should be placed such species as —

Metzgeria conjugata
Plagiochila asplenioides
Bazzania trilobata
Leucobryum glaucum
Stereodon curvifolius
Thamnium alleghaniense

Yet, however much the preceding factors affect the distribution of the Mosses and Hepatics, the problem is eventually reduced to another factor, viz., the amount, nature and continuity of the water supply. Many species grow only on dry, exposed rocks, while to others the presence of free surface-water is essential. Some of the latter grow only in standing or slowly moving water, others are always found in rapidly flowing streams. But the majority of the Bryophytes thrive in an environment where they are not subjected to prolonged periods of drought or inundation.

Taking the requirements with regard to water as a basis, Warming* recognizes four groups of plants:

I. XEROPHYTES: plants which grow on rocks, or on soil which contains, at least during the greater part of the year, a very small amount of water.

II. MESOPHYTES: plants adapted to soil containing a moderate amount of water.

III. HYDROPHYTES: plants which are completely or partly submerged, or which grow in very wet soil.

IV. HALOPHYTES: plants which are adapted to a saline soil.

Considerable attention has been given to the ecological relationships of the higher plants, and several authors have attempted to classify the Bryophytes with respect to their habitats. Warnstorf†, however, was the first to adapt Warming's classification to the group.

Among the Bryophytes there are no true halophytes. Following Warming's classification the other three groups are well defined, and of these groups the species given below may be considered typical members: —

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* Warming: Lehrbuch der ökologischen Pflanzengeographie. Second German edition, 1902, pp. 121, 122.

† Warnstorf: Kryptogamenflora der Mark Brandenburg, 1: 20-25, 1903.

XEROPHYTES.

1. Plants growing on exposed rocks with little or no earth covering — trap ledges, stone walls, bowlders, etc.

Frullania Asagrayana
Andreæa Rothii
Grimmia Olneyi
Ulota Hutchinsiæ
Hedwigia albicans

2. Plants growing on living trees in the open or in the woods.

Frullania eboracensis
Orthotrichum ohioense
Drummondia clavellata
Leucodon julaceus
Thelia hirtella

3. Plants growing on earth, or on rocks with a thin earth covering in fields and along roadsides or in dry woods.

Nardia crenulata
Diplophylleia apiculata
Physcomitrium turbinatum
Pogonatum tenue
Thelia Lescurii
Rhynchostegium serrulatum

MESOPHYTES — for the most part shade-loving plants, but frequently found in the open on the borders of brooks, in meadows, etc.

1. Plants growing on the surface or in the crevices of cliffs and steep rocks.

Reboulia hemisphærica
Leucolejeunea clypeata
Rhabdoweisia denticulata
Didymodon rubellus
Hymenostylium curvirostre

2. Plants growing on soil or humus, on flat earth-covered rocks, on the roots and at the base of trees, or on decaying logs and stumps in wet woods.

Lophocolea heterophylla
Ptilidium pulcherrimum
Timmia cucullata
Polytrichum ohioense
Ptilium Crista-Castrensis
Climacium americanum

Hydrophytes.

1. Plants growing in more or less wooded swamps.

a. On the ground.

Trichocolea tomentella
Elodium paludosum
Brachythecium Novæ-Angliæ
Calliergon cordifolium

b. On sticks and bushes.

Dichelyma capillaceum

2. Plants growing on wet or dripping rocks in streams and ravines.

Riccardia sinuata
Jubula pennsylvanica
Eurynchium rusciforme
Amblystegium Lescurii
Thamnium alleghaniense

3. Plants growing in open bogs, especially peat bogs, and usually forming compact masses of vegetation.

Lepidozia setacea
Scapania irrigua
Sphagnum (most species)
Acrocladium cuspidatum
Drepanocladus aduncus

4. Plants submerged or floating in the water.

Ricciella fluitans
Ricciocarpus natans
Porella pinnata
Sphagnum obesum
Octodiceras Julianum
Fontinalis Lescurii

ECONOMIC VALUE OF THE BRYOPHYTES

Although the majority of the Bryophytes are of small size when compared with the seed-bearing plants, they often form dense and extensive colonies and thus constitute a conspicuous feature of the landscape. This is especially true in mountainous and northern regions, where woody plants are stunted in growth and occur more sparingly than under more favorable climatic conditions. Even in Connecticut, however, where the higher plants exhibit a vigorous development, the Sphagnales and certain of the other Bryophytes are often abundant enough to attract the attention of the ordinary observer.

On account of the tufted habit of so many species and the power which they possess of absorbing and retaining water, they exercise a marked influence on both agriculture and forestry. Their importance from this point of view, which is only beginning to be appreciated, has been clearly demonstrated by Georg Roth.* According to this author, the mosses tend to diminish floods and to reduce the gullying of the soil, at the same time preserving its porosity. They are also of value in adding to the richness of the soil through their decay and in assisting in the disintegration of rocks. The Sphagnales, through their peculiar place and habit of growth, are active in converting lakes and ponds into bogs, which afford a foothold for higher plants and eventually yield a serviceable soil.

From a commercial standpoint the Sphagnales are by far the most important of the Bryophytes. In countries where they are abundant they yield the best quality of peat. This is produced by the death of the older portions of the Peat Mosses, the living stems continuing their upward growth indefinitely. As the dead layer becomes thicker, it becomes more and more compressed, and finally forms a firm and compact mass at the bottom of the bog. This mass is cut into bricks, which are dried and constitute the peat of commerce. Of course the chief use of peat as a fuel is for domestic purposes. In certain localities, however, it is charred and then used in steel and copper mills, where its purity from foreign substances and its power to produce an intense heat make it especially effective.

The Peat Mosses are also useful as a packing substance. In a dry form they are sometimes employed as a filling for pillows and mattresses, especially those used by invalids. They may also be wrapped around steam pipes or packed in the walls of houses, where they act as a non-conducting substance. In a moist form they are being more and more used by gardeners and florists as a packing material for vegetables and other cultivated plants. Owing to their great power of absorption, Peat Mosses are sometimes substituted for straw in stables, and they have also been employed to a limited extent in surgical dressings. The same peculiarity makes it possible to use them for lamp-wicks in the far north.

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*Die europäischen Laubmoose. 1: 62-77. Leipzig, 1905.

A few of the Bryales constitute a secondary source of peat, and others are used as a packing material but to much less extent than the Peat Mosses. Some of the large species, when dried without pressure and dyed, form a component part of decorative wreaths and cords, which are made use of more especially by milliners. The stiff and wiry stems of *Polytrichum commune* have also been employed instead of bristles in the manufacture of brushes. Among the Marchantiales the only species which have ever been used for practical purposes are *Marchantia polymorpha* and *Conocephalum conicum*. These were formerly prescribed in affections of the liver, but it is doubtful if they possess any true therapeutic properties. Except for the fact that a few of the Jungermanniales have been used in the tropics as a packing material for living plants, the remaining orders of the Bryophytes have been put to no practical uses whatever.

CATALOGUE OF CONNECTICUT BRYOPHYTES

The following catalogue records the distribution of the Bryophytes of Connecticut, so far as known to the writers. Under each species the characteristic environment and often the time of fruiting are given, together with the known localities for the state. These are arranged alphabetically by towns under the counties, the latter being given in the following order: Litchfield, Hartford, Tolland, Windham, Fairfield, New Haven, Middlesex, New London. The names of the collectors are also noted, but the only date mentioned is that of the earliest known collection. In case two or more persons have found the same species in the same township, the one who collected it first is the only one alluded to. The local distribution is followed by brief notes regarding the known distribution in North America and in other parts of the world. For the sake of completeness attention is also called to Connecticut specimens which have been distributed in exsiccatæ and to references in the scattered literature of bryology which relate directly to Connecticut plants. The numbers following the authors' names in these references correspond with the list and page numbers in the bibliography.

The genera, where represented by more than a single species, are supplied with artificial keys to the species, and the orders or families are supplied with similar keys to the genera. The arrangement followed is in most respects like that given in Engler & Prantl's "Die natürlichen Pflanzenfamilien." Since, however, the treatment of the Bryales in this work is still incomplete, the hypnoid Mosses are largely arranged according to Warnstorf in the second volume of the "Kryptogamenflora der Mark Brandenburg." Warnstorf is also followed in the position of the Polytrichaceæ and allied families. These apparently represent the most highly developed members of the Bryophytes, and it is therefore most logical to place them at the conclusion of the series.

[Subclass Hepaticæ]

ORDER MARCHANTIALES

FAMILY RICCIACEÆ

1. Terrestrial; green cells in rows at right angles to the upper surface of the thallus, enclosing air spaces in the form of narrow canals; epidermis without pores....**Riccia**
Terrestrial or aquatic; green cells in layers one cell thick, separating the irregular air spaces from one another.. 2

2. Epidermis without pores, sometimes becoming irregularly ruptured with age...............................**Ricciella**
Epidermis with distinct pores, not becoming ruptured with age ....**Ricciocarpus**

Riccia (Mich.) L.

Riccia arvensis Aust.

Cultivated fields and margins of ponds. Autumn. HARTFORD: Hartford, *Harger.* NEW HAVEN: Orange (1892), *Evans.* MIDDLESEX: Middlefield, *Evans.*

Ontario to Maryland.

EXSIC. Miss Haynes, Amer. Hep. No. 2.

REF. Evans, **28**, 170. Underwood, **74**, 278; **76**, 4.

Ricciella A. Br.

1. Capsules rupturing on the upper surface of the thallus; epidermis soon breaking down and leaving the sponge-like green tissue exposed...................**R. crystallina**
Capsules rupturing on the lower surface of the thallus 2

2. Aquatic, or rooting on wet mud; epidermis persistent **R. fluitans**
Terrestrial; epidermis eventually breaking down **R. Sullivantii**

Ricciella crystallina (L.) Warnst. *Riccia crystallina* L.

On mud, often growing on margins of ponds. Autumn. New Haven: Oxford (1898), *Harger.*

Connecticut west to Oregon and south to the West Indies and California; Europe; Asia.

Ref. Evans, **26**, 207; **28**, 170.

Ricciella fluitans (L.) A. Br. *Riccia fluitans* L.

Floating in ponds or slow streams or rooting in mud. Autumn. Litchfield: Goshen, *Underwood.* Hartford: Berlin, *Coleman;* Southington, *Andrews.* Windham: Plainfield, *Sheldon.* Fairfield: Bethel, *Underwood;* Danbury, *Nichols.* New Haven: Branford, *Evans;* Hamden, *O. D. Allen;* New Haven (1868), *Eaton;* North Branford, *Evans;* Southbury, *Harger.*

New England and Ontario, west to British Columbia and south into tropical America; Europe; Asia; Africa; New Zealand.

Exsic. Underwood & Cook, Hep. Amer. No. 11 (as *Riccia fluitans*).

Ref. Eaton, **15**, 68. Evans, **28**, 170.

Ricciella Sullivantii (Aust.) Evans. *Riccia Sullivantii* Aust.

Cultivated fields and margins of ponds. Autumn. Hartford: East Hartford, *Weatherby;* Hartford, *Harger.* Fairfield: Danbury, *Nichols.* New Haven: East Haven, *Evans;* Milford, *Miss Lorenz;* New Haven, *O. D. Allen;* Orange (1876), *Eaton;* Oxford, *Harger.* Middlesex: Middlefield, *Evans.*

New England to Virginia and west to Ohio.

Ref. Eaton, **15**, 68. Evans, **28**, 170; **33**, 56.

Ricciocarpus Corda

Ricciocarpus natans (L.) Corda. *Riccia natans* L.

Floating in ponds or growing on mud. May and June.

Litchfield: Salisbury, *Mrs. Phelps.* Hartford: New Britain, *Shepard.* Fairfield: Fairfield and Stratford, *Eames.* New Haven: East Haven, *J. A. Allen;* Milford, *Eames;* New Haven (1875), *Eaton;* Oxford, *Harger.* Middlesex: Clinton, *Miss Marion Clark.*

New England west to British Columbia and south to Mexico; Brazil; Europe; Asia; Australia.

Ref. Eaton 15, 68. Evans, 28, 170.

FAMILY MARCHANTIACEÆ

1 Air chambers in several layers, separated from one another by plates of green cells.............................. 2
Air chambers in a single layer, the green cells arranged in simple or branched rows arising from the floors of the chambers 4

2. Sporophytes destitute of distinct pseudoperianths........ 3
Sporophytes each surrounded by a distinct pseudoperianth, consisting of a thin membrane divided longitudinally into eight segments..............................**Asterella**

3. Ventral scales of thallus purple, scarcely projecting beyond the margin; capsule only partially filling the involucral cavity ....**Reboulia**
Ventral scales of thallus soon becoming bleached, extending far beyond the margin, and usually forming a dense tuft at the apex; capsule completely filling the involucral cavity ....**Grimaldia**

4. Pores in epidermis of thallus simple, each surrounded by a single layer of cells.............................. 5
Pores in epidermis compound or barrel-shaped, each surrounded by cells arranged in several tiers............ 6

5. Outlines of air chambers distinct to the naked eye; gemmæ none; plant native ....**Conocephalum**
Outlines of air chambers indistinct to the naked eye; gemmæ abundant, produced in crescentic receptacles; plant introduced into greenhouses..............**Lunularia**

6. Gemmæ none; carpocephala with indistinct flat rays **Preissia**
Gemmæ usually abundant, produced in cup-shaped receptacles; carpocephala with distinct terete rays **Marchantia**

Reboulia Raddi

Reboulia hemisphærica (L.) Raddi. *Asterella hemisphærica* Beauv.

On shaded banks and in crevices of rocks. May and June.

Litchfield: New Milford, *Evans.* Hartford: Windsor, *Evans.* Fairfield: Redding, *Miss Haynes;* Sherman, *Evans.* New Haven: Branford, *Livingston;* Hamden and New Haven (1873), *Eaton;* Oxford, *Harger;* Woodbridge, *J. A. Allen.* Middlesex: Middletown, *Evans.* New London: Montville, *Lumsden.*

New England west to British Columbia and south to Mexico; Europe; Asia; Africa; South America; Australia.

Ref. Eaton, **15**, 68. Evans, **28**, 170.

Grimaldia Raddi

Grimaldia fragrans (Balb.) Corda. *Grimaldia barbifrons* Bisch.

Thin soil on rocks, often in exposed localities. May and June. Litchfield: Salisbury, *Evans.* Hartford: Farmington, *Miss Lorenz;* Hartford, *H. S. Clark;* Simsbury, *Miss Lorenz.* Fairfield: Monroe, *Miss Lorenz.* New Haven: New Haven (1856), *Eaton;* North Haven, *Evans;* Orange, *Harger;* Woodbridge, *Evans.*

Quebec and New England west to Alaska and south to New Mexico and Texas; Europe; northern Asia.

Exsic. Underwood & Cook, Hep. Amer. No. 121.

Ref. Eaton, **15**, 68. Evans, **28**, 170. Underwood, **71**, 35; **75**, 68.

Asterella Beauv.

Asterella tenella (L.) Beauv. *Fimbriaria tenella* Nees.

Shaded banks and thin soil on rocks. May and June. Litchfield: New Milford, *Evans.* Tolland: Andover, *Weatherby;* Bolton, *Nichols.* Windham: Canterbury, *Mrs. Hadley.* New Haven: Cheshire, *Evans;* East Haven, *J. A. Allen;* Hamden (1868), *Eaton;* Oxford, *Harger;* Woodbridge, *Hall.* Middlesex: Middletown, *Evans.*

New England west to Missouri and south to Georgia.

Ref. Eaton, **15**, 68. Evans, **28**, 170.

Conocephalum Wigg.

Conocephalum conicum (L.) Dumort.

On shaded banks and rocks, especially along streams. April and May. Litchfield: Goshen, *Underwood;* New Milford and Salisbury, *Evans.* HARTFORD: Southington, *Chamberlain;* Windsor, *W. E. Britton.* TOLLAND: Bolton and Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley;* Plainfield, *Sheldon;* Windham, *Nichols.* FAIRFIELD: Danbury, *Nichols;* Greenwich, *Miss Haynes;* Huntington, *Evans;* Redding, *Underwood;* Sherman, *Evans.* NEW HAVEN: Cheshire, *Harger;* Hamden and New Haven (1856), *Eaton;* North Haven and Woodbridge, *Evans.* MIDDLESEX: Chester, *Nichols.* NEW LONDON: Ledyard, *Nichols.*

Newfoundland west to Alaska and south to Florida and Nebraska; Europe; Asia.

REF. Eaton, 15, 69. Evans, 28, 170. Underwood, 75, 67.

Preissia Corda

Preissia quadrata (Scop.) Nees.

On rocks and banks, more abundant in limestone districts. May and June. LITCHFIELD: New Milford and Salisbury (1892), *Evans.* HARTFORD: Windsor, *Evans.* TOLLAND: Bolton, *Nichols.* FAIRFIELD: Sherman, *Evans.* NEW HAVEN: North Haven, *Nichols;* Orange, *Evans.*

Greenland to Alaska and south to Mexico; Europe; Asia.

REF. Evans, 28, 170.

Lunularia (Mich.) Adans.

Lunularia cruciata (L.) Dumort. *L. vulgaris* Raddi.

Introduced into greenhouses, and reproducing (in the eastern United States) solely by means of gemmæ. NEW HAVEN: New Haven (1868), *Eaton.* Doubtless widely distributed throughout the state.

New England west to California and south to the West Indies; native in the Mediterranean regions of Europe, Asia, and Africa; Chile; Australia.

REF. Eaton, 15, 69. Evans, 28, 170.

Marchantia (March. f.) L.

Marchantia polymorpha L.

On banks and rocks, in swamps, gardens, and cultivated fields. June-August. LITCHFIELD: Goshen, *Underwood;*

New Milford, *Evans*. HARTFORD: Windsor, *Evans*. TOLLAND: Bolton, *Nichols*. WINDHAM: Canterbury, *Mrs. Hadley*. FAIRFIELD: Sherman, *Evans*. NEW HAVEN: Branford, *Hall;* East Haven, *Harger;* New Haven (1856), *Eaton;* Orange, *Evans;* Oxford, *Harger;* Woodbridge, *O. D. Allen*.

Greenland to Alaska, south to Florida and the West Indies; Europe; Asia.

REF. Eaton, 15, 69. Evans, 28, 170. Underwood, 75, 69.

ORDER JUNGERMANNIALES

FAMILY METZGERIACEÆ

1. Gametophyte a thallus with no indication of leaves; capsule splitting longitudinally at maturity into four valves .... [illegible]
   Gametophyte more or less clearly differentiated into stem and leaves 5
2. Thallus composed of parenchyma throughout 3
   Thallus with a median strand of narrow elongated cells 4
3. Branches lateral: capsule oval .... **Riccardia**
   Branching produced by forking; capsule spherical.... **Pellia**
4. Thallus repeatedly forking, bearing cilia on the margin; antheridia and archegonia borne on short ventral branches .... **Metzgeria**
   Thallus simple or with scattered ventral branches, margin entire; antheridia and archegonia borne on dorsal surface .... **Pallavicinia**
5. Leaves in the form of marginal crenulate scallops; rhizoids colorless; capsule splitting longitudinally at maturity into four valves .... **Blasia**
   Leaves distinct; rhizoids purple; capsule splitting irregularly at maturity .... **Fossombronia**

Riccardia S. F. Gray

1. Thallus mostly 4-10 mm. broad, sparingly branched **R. pinguis**
   Thallus mostly 1-2 mm. broad, copiously branched...... 2
2. Thallus pinnate or bipinnate 3
   Thallus palmate or irregularly branched 4
3. Ultimate branches distinctly bordered by 2 or 3 rows of cells .... **R. multifida**
   Ultimate branches indistinctly bordered by one row of cells .... **R. sinuata**

4. Cortical cells averaging 0.07 × 0.04 mm; gemmæ rare **R. latifrons**
   Cortical cells averaging 0.04 × 0.025 mm; gemmæ two-celled, often abundant.........................**R. palmata**

Riccardia pinguis (L.) S. F. Gray. *Aneura sessilis* Spreng.

In swamps. April-June. LITCHFIELD: New Milford and Salisbury, *Nichols*. HARTFORD: Hartford, *A. H. Graves*. NEW HAVEN: East Haven (1874), *Hall;* Orange, *Evans*. MIDDLESEX: Cromwell, *Evans*.

Greenland to Alaska, and south to the West Indies, Mexico, and Brazil; Europe; Asia; Africa; Australia.

REF. Eaton, 15, 69. Evans, **28**, 170.

Riccardia multifida (L.) S. F. Gray. *Aneura multifida* Dumort.

In swamps and on wet rocks. May and June. LITCHFIELD: Salisbury, *Evans*. FAIRFIELD: Redding, *Evans*. NEW HAVEN: Orange (1876) and Woodbridge, *J. A. Allen*.

Newfoundland and Nova Scotia, south to Virginia; British Columbia to California; Europe; Asia.

REF. Eaton, 15, 69. Evans, **28**, 170.

Riccardia sinuata (Dicks.) Trevis. *Aneura pinnatifida* Nees, in part.

On dripping rocks. April and May. NEW HAVEN: Hamden (1855), *Eaton;* Woodbridge, *J. A. Allen*.

New England south to New Jersey; also in British Columbia; Europe; Asia. A rare species, the range of which is very incompletely known.

EXSIC. Austin, Hep. Bor.-Amer. No. 115, in part (as *Aneura pinnatifida*). Miss Haynes, Amer. Hep. No. 36.

REF. Eaton, 15, 69. Evans, **28**, 170. Underwood, **71**, 55; **72**, 726.

Riccardia latifrons Lindb.

On rotten logs. May-August. LITCHFIELD: Salisbury, *Evans*. TOLLAND: Bolton and Stafford, *Nichols*. NEW HAVEN: Cheshire, *Evans;* Woodbridge (1879), *J. A. Allen*.

Newfoundland west to Alaska and south to New England and New York; Europe; Asia.

REF. Evans, **28**, 170.

Riccardia palmata (Hedw.) Carruth.

On rotten logs. May and June. NEW HAVEN: Cheshire (1887), *Setchell.*

Nova Scotia west to Alaska and south to New England, New York, and California; Europe; Asia.

REF. Evans, **28**, 170.

Metzgeria Raddi

Metzgeria conjugata Lindb. *M. furcata* of some authors.

On shaded rocks and trunks of trees. May and June. LITCHFIELD: New Milford, *Evans.* WINDHAM: Canterbury, *Mrs. Hadley;* Killingly, *Rounds.* FAIRFIELD: Danbury, *Eaton;* Redding, *Miss Haynes.* NEW HAVEN: East Haven, *Eaton;* Hamden, *J. A. Allen;* Meriden, *Evans;* New Haven (1856) and Orange, *Eaton;* Seymour, *Evans.* MIDDLESEX: Killingworth, *Evans.* NEW LONDON: Norwich, *Setchell.*

New England west to Alaska and south to Argentina and Chile; Europe; Asia; Africa.

REF. Eaton, **15**, 69. Evans, **28**, 170.

Pallavicinia S. F. Gray

Pallavicinia Lyellii (Hook.) S. F. Gray. *Steetzia Lyellii* Lehm.

In swamps and bogs, sometimes aquatic. April-June. LITCHFIELD: Norfolk, *Miss Lorenz.* HARTFORD: East Hartford, *Miss Lorenz;* Windsor, *Evans.* TOLLAND: Stafford and Vernon, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* NEW HAVEN: Bethany and East Haven, *Evans;* Hamden, *J. A. Allen;* Madison and Middlebury, *Evans;* New Haven (1877), *J. A. Allen;* North Haven, *Evans;* Oxford, *Harger.* MIDDLESEX: Chester, *Nichols.* NEW LONDON: Groton, Preston, and Waterford, *C. B. Graves.*

Newfoundland west to Ontario and south into tropical America; Europe; Asia; Africa; New Zealand.

REF. Eaton, **15**, 69. Evans, **28**, 170.

Pellia Raddi

Pellia epiphylla (L.) Corda.

On shaded banks and damp rocks. April and May. Litchfield: Goshen, *Underwood;* Salisbury, *Mrs. Phelps.* Hartford: Windsor, *W. E. Britton.* Windham: Canterbury, *Mrs. Hadley.* Fairfield: Huntington, *Evans;* Redding, *Miss Haynes.* New Haven: Bethany, *Evans;* Hamden, *J. A. Allen;* Madison, *Nichols;* New Haven, *Evans;* Orange (1873), *Hall;* Woodbridge, *Eaton.* Middlesex: Chester, *Nichols.*

Labrador to Alaska and south to New England, New York, and Indiana; Europe; Asia.

Exsic. Miss Haynes, Amer. Hep. No. 35.

Ref. Eaton, **15**, 69. Evans, **28**, 170.

Blasia L.

Blasia pusilla L.

On damp banks and rocks. April and May. Litchfield: Cornwall, *Underwood;* Salisbury, *Nichols.* Windham: Canterbury, *Mrs. Hadley.* Fairfield: Huntington, *Evans.* New Haven: Derby, *J. A. Allen;* Hamden (1875), *Hall.*

Nova Scotia west to Alaska and south to Virginia, New Mexico, and California; Europe; Asia.

Exsic. Underwood & Cook, Hep. Amer. No. 5.

Ref. Eaton, **15**, 69. Evans, **28**, 170.

Fossombronia Raddi

1. Annual; capsules mature in autumn........................ 2
Perennial; capsules mature in May and June........**F. salina**
2. Spores with subparallel and rarely anastomosing ridges **F. Wondraczekii**
Spores with anastomosing ridges forming a network **F. foveolata**

Fossombronia salina Lindb.

On earth in wet pastures and swamps. May and June. New Haven: East Haven, *Evans;* Hamden (1879) and Orange, *J. A. Allen.*

Connecticut south to Florida and the West Indies and west to Tennessee and Arkansas.

Ref. Evans, **24**, 10; **28**, 170.

Fossombronia Wondraczekii (Corda) Dumort.

In damp fields and along roadsides. Sept.-Nov. NEW HAVEN: Oxford (1894), *Harger*. MIDDLESEX: Portland, *Johnson*.

New England west to Indiana and south to Maryland; Europe; Asia.

REF. Evans, **24**, 10; **28**, 170.

Fossombronia foveolata Lindb.

In damp fields and along roadsides. Sept.-Nov. NEW HAVEN: Branford, Cheshire, and Hamden, *Evans;* Milford, *Miss Lorenz;* New Haven, *Evans;* Orange (1879), *J. A. Allen*. MIDDLESEX: Portland, *Evans*.

Quebec and Ontario west to British Columbia and south to New Jersey and Delaware; Europe.

REF. Evans, **28**, 170.

FAMILY JUNGERMANNIACEÆ

1. Leaves undivided and with entire margins.............. 2

Leaves variously toothed, lobed, cleft, or divided........ 9

2. Archegonia borne on the stem or a leading branch...... 3

Archegonia borne on a short branch, usually arising ventrally 7

3. Bracts undivided, similar to the leaves.................. 4

Bracts variously incised or cleft..........**Jamesoniella**, p. 52

4. Uppermost bracts apparently adnate with the base of the perianth ....**Nardia**, p. 50

Uppermost bracts entirely free from the perianth........ 5

5. Perianth terete and more or less contracted at the mouth **Jungermannia**, p. 51

Perianth laterally compressed and truncate at the mouth 6

6. Growing in damp or wet woods on various substrata; stems with few or no rhizoids; leaves never gemmiparous **Plagiochila**, p. 56

Growing in open bogs; stems with numerous rhizoids; leaves often gemmiparous.....................**Mylia**, p. 56

7. Leaves succubous; sporophyte enclosed within a perianth 8

Leaves incubous; sporophyte developed within a pendent perigynium ....**Calypogeia**, p. 62

8. Leaf cells without trigones ....**Chiloscyphus**, p. 58

Leaf cells with distinct trigones........**Odontoschisma**, p. 62

9.	Leaves not complicate, usually expanded in one plane	10
	Leaves distinctly complicate, the two portions meeting at a more or less distinct keel	22
10.	Leaves succubous	11
	Leaves incubous	19
11.	Leaves bidentate or bilobed	12
	Leaves with more than two teeth or lobes	18
12.	Underleaves distinct	13
	Underleaves none or very minute	16
13.	Underleaves distinctly bifid	14
	Underleaves undivided or with a few marginal teeth or cilia	15
14.	Sporophyte enclosed within a perianth **Lophocolea,** p.	57
	Sporophyte developed within a pendent perigynium **Geocalyx,** p.	59
15.	Growing on rotten logs, often gemmiparous **Harpanthus,** p.	59
	Growing on calcareous rocks, never gemmiparous **Lophozia Muelleri,** p.	53
16.	Perianth terete, more or less plicate at the mouth **Lophozia,** p.	52
	Perianth trigonous	17
17.	Leaf cells 0.025-0.05 mm. in diameter **Cephalozia,** p.	59
	Leaf cells 0.01-0.02 mm. in diameter **Cephaloziella,** p.	61
18.	Leaves undivided, margin sharply toothed **Plagiochila,** p.	56
	Leaves with three or four broad teeth **Lophozia,** p.	52
19.	Leaves bidentate at the apex; ventral flagelliform branches none **Calypogeia,** p.	62
	Leaves mostly with three or four teeth, lobes, or divisions	20
20.	Stems apparently dichotomous; ventral flagelliform branches numerous **Bazzania,** p.	64
	Stems pinnately branched; ventral flagelliform branches none	21
21.	Divisions or lobes of leaves two or more cells wide, at least at the base; archegonia borne on short ventral branches **Lepidozia,** p.	65
	Divisions of leaves only one cell wide throughout; archegonia borne on the main stem or on leading lateral branches **Blepharostoma,** p.	66
22.	Ventral lobe of leaf equaling or surpassing the dorsal in size	23
	Ventral lobe smaller than the dorsal	26

23. Bracts apparently adnate to the base of the perianth.. **Marsupella,** p. 50
Bracts entirely free from the perianth.................. 24

24. Perianth strongly dorsi-ventrally compressed, not plicate in upper part............................**Scapania,** p. 68
Perianth terete or slightly compressed, more or less plicate in upper part.. 25

25. Keels of leaves sharp...................**Diplophylleia,** p. 67
Keels of leaves blunt....................**Sphenolobus,** p. 55

26. Leaves and underleaves with fringed margins.............. 27
Leaves and underleaves (when present) with entire or denticulate margins 28

27. Plants green, often tinged with brown or red, growing in rather dry localities; leaf cells with trigones and a smooth cuticle ....**Ptilidium,** p. 66
Plants pale green or yellowish, growing on the ground in swamps; leaf cells thin-walled, with a minutely striolate cuticle ....**Trichocolea,** p. 67

28. Underleaves present 29
Underleaves none 33

29. Underleaves undivided 30
Underleaves bifid 31

30. Ventral lobe of leaf not inflated, attached to the stem by a narrow base..............................**Porella,** p. 70
Ventral lobe of leaf inflated and forming a small water-sac, attached to the stem by a broad base........... **Leucolejeunea,** p. 72

31. Ventral lobe of leaf attached to the stem by a broad base, forming an inflated water-sac..............**Lejeunea,** p. 72
Ventral lobe of leaf usually forming an inflated water-sac, entirely free from the stem........................ 32

32. Archegonial branch with one or two subfloral innovations **Jubula,** p. 72
Archegonial branch without subfloral innovations........ **Frullania,** p. 73

33. Dorsal lobes of leaves smooth and entire; perianth dorsi-ventrally compressed, truncate at the mouth.......... **Radula,** p. 69
Dorsal lobes of leaves denticulate and minutely roughened on outer surface by projecting cells; perianth inflated, five-keeled, and contracted at the mouth into a tubular beak ....**Cololejeunea,** p. 71

Marsupella Dumort.

Plants varying from green to reddish; leaves with a broad sinus and bluntly pointed lobes.............. **M. emarginata**

Plants varying from green to deep purplish black; leaves with a narrow sinus and rounded lobes....... **M. Sullivantii**

Marsupella emarginata (Ehrh.) Dumort.

On damp shaded rocks. May and June. LITCHFIELD: Salisbury, *Nichols*. NEW HAVEN: Branford, *Evans;* Middlebury, *Harger;* Naugatuck, *Evans;* Oxford, *Harger;* Woodbridge (1879), *J. A. Allen*.

Labrador west to Alaska and south to Virginia, Minnesota, and California; Europe; Asia.

REF. Evans, **28**, 172.

Marsupella Sullivantii (DeNot.) Evans. *Marsupella sphacelata* of some authors, not (Gieseke) Dumort. *M. media* (Gottsche) Schiffn.

On shaded rocks. May and June. HARTFORD: Southington, *Miss Lorenz*. NEW HAVEN: Hamden and Naugatuck (1890), *Evans*.

Nova Scotia south to Georgia; Washington; Europe.

REF. Evans, **28**, 172; **30**, 167; **33**, 57.

Nardia S. F. Gray

1. Growing on sandy soil; rhizoids colorless; leaves (or at least the bracts) bordered by a row of thick-walled cells; leaf cells otherwise thin-walled throughout or with minute trigones .... **N. crenulata**

   Growing on damp rocks or banks; rhizoids more or less tinged with purple; leaf cells with distinct trigones.... 2

2. Leaves bordered by a row of thick-walled cells.......... **N. crenuliformis**

   Leaves not bordered, their cell structure uniform throughout .... **N. hyalina**

Nardia crenulata (Sm.) Lindb. *Jungermannia crenulata* Sm.

On sandy soil, especially along roadsides and shaded paths. April-June. LITCHFIELD: Cornwall and Litchfield, *Underwood*. TOLLAND: Bolton, *Nichols*. FAIRFIELD: Huntington and Redding, *Evans*. New Haven: Hamden, *Eaton;* Meriden, *Evans;* New Haven (1866), *Eaton;* Orange, *Evans;* Oxford, *Harger;* Woodbridge, *J. A. Allen*. Middlesex: Middlefield, *Evans*.

Greenland west to British Columbia and south to Alabama and California; Europe; Asia.

Exsic. Underwood & Cook, Hep. Amer. No. 57.

Ref. Eaton, 15, 71. Evans, 28, 172.

Nardia crenuliformis (Aust.) Lindb.

On rocks along streams. May and June. New Haven: Beacon Falls (1907), *Evans*.

Connecticut to Ohio and south to New Jersey and West Virginia.

Nardia hyalina (Lyell) Carr.

On damp shaded rocks and banks. May and June. Windham: Canterbury, *Mrs. Hadley*. New Haven: Ansonia (1880), *J. A. Allen;* Beacon Falls, *Evans;* Hamden, *J. A. Allen;* Naugatuck, *Evans*. Middlesex: Middletown, *Evans*.

New England to Minnesota and south to Maryland; Europe; Peru.

Ref. Evans, 26, 209; 28, 172.

Jungermannia (Rupp.) L.

1. Leaf cells with trigones; monoicous: perianth abruptly contracted at the apex into a short depressed beak.... **J. lanceolata**
   Leaf cells without trigones; perianth gradually contracted at the apex 2
2. Small species, stems 5-10 mm. long; monoicous......**J. pumila**
   Large species, stems mostly 2-8 cm. long; dioicous...... **J. cordifolia**

Jungermannia lanceolata L. *Liochlæna lanceolata* Nees.

On shaded banks. May and June. New Haven: Hamden (1877) and New Haven, *J. A. Allen;* Oxford, *Harger*.

Labrador west to British Columbia and south to New Jersey, Indiana, and Washington; Europe; Asia; Madeira Islands.

Ref. Eaton, 15, 71. Evans, 28, 171.

Jungermannia pumila With.

On wet rocks, often in brooks. May and June. NEW HAVEN: Hamden (1877), *J. A. Allen;* North Branford, *Evans.*

Greenland south to Maryland; Europe.

REF. Evans, 28, 171.

Jungermannia cordifolia Hook.

On wet rocks along streams. HARTFORD: Windsor (1903), *Miss Lorenz.*

Greenland west to Alaska and south to New England and Colorado; Europe; Asia; South America.

REF. Evans, 30, 170.

Jamesoniella (Spruce) Steph.

Jamesoniella autumnalis (DC.) Steph. *Jungermannia Schraderi* Mart.

On banks, rocks, and rotten logs. Sept.-Nov. LITCHFIELD: New Milford, *Evans;* Salisbury, *Adams.* HARTFORD: Simsbury, *Miss Lorenz.* TOLLAND: Vernon, *Nichols.* NEW HAVEN: Bethany, *Evans;* Hamden (1878), *Eaton;* Naugatuck, *Evans;* New Haven, *O. D. Allen;* Orange, *Evans;* Oxford, *Harger;* Woodbridge, *Nichols.* MIDDLESEX: Cromwell, *Evans.*

Greenland to British Columbia and south to Virginia and Missouri; Europe; Asia.

REF. Eaton, 15, 71. Evans, 28, 171.

Lophozia Dumort.

1. Leaves bidentate or bilobed throughout.................. 2
Leaves tri- or quadridentate, at least on fertile stems, sometimes bidentate on poorly developed stems........ 7

2. Teeth or lobes acute 3
Teeth or lobes rounded ....**L. inflata**

3. Underleaves none; perianth plicate in upper part, and not strongly contracted at the mouth...................... 4
Underleaves present; perianth scarcely plicate in upper part, and contracted at the mouth into a short beak..**L. Muelleri**

4. Dioicous 5
Monoicous (paroicous) 6

5. Growing on rocks; leaf cells with small trigones . . **L. ventricosa**
Growing on rotten logs; leaf cells with large trigones . . **L. porphyroleuca**
6. Plants with a distinct aromatic odor; leaf cells with strongly thickened walls . . . . **L. bicrenata**
Plants odorless; leaf cells thin-walled, but with small trigones . . . . **L. excisa**
7. Plants firm, dark green; leaves but little altered when dry 8
Plants delicate, pale or bright green; leaves strongly crispate when dry 10
8. Teeth of leaves subequal, the lateral margins nearly straight and of about the same length 9
Apical (or ventral) tooth larger than the others, the corresponding lateral margin long and strongly curved . . **L. Lyoni**
9. Gemmæ usually abundant, borne on upright flagelliform shoots with closely appressed leaves . . . . **L. attenuata**
Gemmæ rare, not borne on flagelliform shoots . . . . . . **L. barbata**
10. Lobes of leaves more or less toothed . . . . **L. incisa**
Lobes of leaves entire . . . . **L. marchica**

Lophozia inflata (Huds.) M. A. Howe.

On damp shaded rocks. TOLLAND: Bolton, *Nichols*. NEW HAVEN: Branford (1892) and Naugatuck, *Evans*.

Greenland to Alaska and south to New Jersey and California; Europe; Asia.

REF. Evans, **28**, 172.

Lophozia Muelleri (Nees) Dumort.

In crevices of calcareous rocks. May and June. LITCHFIELD: Salisbury (1897), *Evans*.

Quebec to Connecticut; Europe; Asia.

REF. Evans, **32**, 35.

Lophozia bicrenata (Schmid.) Dumort. *Jungermannia excisa* of some authors.

On rocks, shaded earth, and banks. May and June. LITCHFIELD: Goshen, *Underwood*. TOLLAND: Bolton and Vernon, *Nichols*. FAIRFIELD: Huntington, *Evans*. NEW HAVEN: Beacon Falls, *Nichols;* Hamden (1878), *J. A. Allen;* Meriden, *Evans;* Orange, *J. A. Allen;* Seymour, *Harger*.

Quebec and Ontario south to Pennsylvania and New Jersey; Europe; Asia.

REF. Eaton, 15, 71. Evans, 26, 209; 28, 172.

Lophozia excisa (Dicks.) Dumort.

On rocks. NEW HAVEN: North Haven (1906), *Evans.*

Labrador to New England and west to British Columbia; Europe; Asia. The species has been confused in North America with *L. bicrenata,* and its range is therefore not very definitely known.

REF. Evans, 33, 73. Miss Haynes, 44, 99, *pl. 9, f. 10-13.*

Lophozia ventricosa (Dicks.) Dumort.

On rocks. LITCHFIELD: Salisbury (1908), *Miss Lorenz.*

Greenland to Alaska, south to New England, Minnesota, and California; Europe; Asia.

Lophozia porphyroleuca (Nees) Schiffn.

On rotten logs. TOLLAND: Stafford (1906), *Nichols.*

Greenland to British Columbia, south to New England and Washington; Europe; Asia.

REF. Evans, 33, 73.

Lophozia marchica (Nees) Steph. *Jungermannia Novæ-Cæsareæ* Evans. *L. Novæ-Cæsareæ* Steph.

In bogs and on wet sandy soil. May and June. FAIRFIELD: Huntington, *Evans.* NEW HAVEN: East Haven (1892) and Orange, *Evans.*

New England south to Delaware and West Virginia; Europe.

REF. Evans, 20, 309; 26, 212; 28, 172. Stephani, 67^2, 153.

Lophozia incisa (Schrad.) Dumort.

On shaded banks and rotten logs. May and June. LITCHFIELD: Winchester, *Miss Lorenz.* TOLLAND: Stafford, *Nichols.* NEW HAVEN: Hamden (1877), *O. D. Allen;* Woodbridge, *Evans.*

Greenland to Alaska, and south to New England, Minnesota, and California; Europe; Asia.

REF. Evans, 28, 172.

Lophozia barbata (Schreb.) Dumort. *Jungermannia barbata* Schreb.

On rocks. May and June. Litchfield: Goshen, *Underwood.* Hartford: Farmington, *Miss Lorenz.* New Haven: East Haven, *Evans;* Hamden, *J. A. Allen;* Meriden, *Evans;* New Haven (1877), *J. A. Allen;* Southbury, *Harger.* Middlesex: Durham, *Evans.*

Greenland to Yukon, and south to New York and New Jersey; Europe; Asia.

Ref. Eaton, **15**, 71. Evans, **28**, 172.

Lophozia attenuata (Mart.) Dumort. *L. gracilis* (Schleich.) Steph.

On shaded rocks and logs. Litchfield: Salisbury (1892), *Evans.*

Greenland to Alaska, south to New England and New York; Europe; Asia.

Ref. Evans, **31**, 58.

Lophozia Lyoni (Tayl.) Steph.

On shaded rocks. New Haven: Meriden (1890), *Evans.*

Greenland to Alaska, and south to New England and Minnesota; Europe; Asia.

Ref. Evans, **26**, 210; **28**, 172.

Sphenolobus (Lindb.) Steph.

Dorsal lobe much smaller than the ventral, often tooth-like **S. exsectus**

Lobes subequal .... **S. Michauxii**

Sphenolobus exsectus (Schmid.) Steph.

On shaded rocks. Litchfield: New Milford, *Evans.* New Haven: Branford (1903) and Naugatuck, *Evans.*

Quebec to British Columbia, south to West Virginia and Colorado; Europe; Asia.

Ref. Evans, **28**, 173; **30**, 171.

Sphenolobus Michauxii (Web. f.) Steph.

On shaded rocks. Litchfield: Salisbury (1892), *Evans.*

Labrador to British Columbia, south to Virginia and Minnesota; Europe; Asia.

REF. Evans, 31, 58.

Plagiochila Dumort.

Leaves broadly ovate, entire or denticulate, the teeth more than ten .... **P. asplenioides**

Leaves narrowly ovate, sharply dentate, the teeth less than ten .... **P. Sullivantii**

Plagiochila asplenioides (L.) Dumort. Including *P. porelloides* Nees.

On rocks and banks, often in wet localities. May and June. LITCHFIELD: New Milford and Salisbury, *Evans*. HARTFORD: Burlington, *Nichols*. TOLLAND: Stafford, *Nichols*. WINDHAM: Canterbury, *Mrs. Hadley*. FAIRFIELD: Huntington, *Evans;* Redding, *Miss Haynes;* Sherman, *Evans*. NEW HAVEN: Beacon Falls, *Evans;* Bethany, *Hall;* Hamden (1855), New Haven, and Orange, *Eaton;* Oxford, *Harger;* Woodbridge, *Evans*. MIDDLESEX: Cromwell, *Evans;* Killingworth, *Hall;* Middlefield and Middletown, *Evans*. NEW LONDON: Ledyard, *Nichols*.

Newfoundland to Alaska, and south to Virginia, Minnesota, and California; Europe; Asia.

REF. Eaton, 15, 71. Evans, 28, 172.

Plagiochila Sullivantii Gottsche. *P. spinulosa* of some authors.

On shaded rocks. FAIRFIELD: Redding, *Evans*. NEW HAVEN: Branford and Naugatuck (1890), *Evans*.

New Hampshire to North Carolina.

EXSIC. Underwood & Cook, Hep. Amer. No. 111 (as *P. spinulosa*), collected at Naugatuck, *Evans*, but incorrectly labeled "Beacon Falls."

REF. Evans, 21, 191, *pl. 15, f. 18, 21, pl. 16, f. 1-3;* 28, 172. Stephani, 67^2, 319.

Mylia S. F. Gray

Mylia anomala (Hook.) S. F. Gray.

Among Sphagna in bogs. LITCHFIELD: Woodbury, *Evans*. NEW HAVEN: Bethany (1892) and New Haven, *Evans*.

New Brunswick to Yukon, and south to New Jersey and Washington; Europe; Asia.

Exsic. Underwood & Cook, Hep. Amer. No. 151.

Ref. Evans, 28, 172. Underwood, 73, 300.

Lophocolea Dumort.

1. Plants growing on wet rocks; leaves gradually narrowed toward the apex and divided into two sharp teeth; dioicous .... **L. bidentata**
   Plants growing on banks, rotten logs, or damp rocks; leaves scarcely narrowed toward the apex 2
2. Leaves varying from bifid to truncate and undivided; monoicous (paroicous); gemmæ none .... **L. heterophylla**
   Leaves bidentate; dioicous; gemmæ abundant, borne on rudimentary leaves .... **L. minor**

Lophocolea bidentata (L.) Dumort.

On rocks near or in streams. May and June. Hartford: Windsor, *Evans.* New Haven: Hamden (1877), *J. A. Allen;* Orange, *Evans.* Middlesex: Cromwell, *Evans.*

Ontario south to Connecticut and Virginia; Europe; tropical and antarctic America.

Exsic. Underwood & Cook, Hep. Amer. No. 95.

Ref. Eaton, 15, 71; Evans, 28, 172.

Lophocolea heterophylla (Schrad.) Dumort. Including *L. Austini* Lindb.

On rotten logs, shaded banks, and earth in woods. May-July. Litchfield: Goshen, *Underwood;* New Milford, *Evans;* Salisbury, *Nichols.* Tolland: Bolton and Stafford, *Nichols.* Fairfield: Huntington and Sherman, *Evans.* New Haven: Beacon Falls and Derby, *Evans;* East Haven and Hamden, *O. D. Allen;* Meriden and Middlebury, *Evans;* New Haven (1866), *Eaton;* North Branford, North Haven, and Orange, *Evans;* Oxford, *Harger;* Seymour, *Evans.* Middlesex: Durham, *Evans;* Killingworth, *Nichols;* Middlefield, *Evans.* New London: Ledyard, *Nichols.*

Nova Scotia to British Columbia, and south to North Carolina, Minnesota, and California; Europe; Asia.

Exsic. Underwood & Cook, Hep. Amer. No. 186, in part (as *L. Austini*).

Ref. Eaton, **15**, 71. Evans, **23**, *pl. 6;* **28**, 172.

Lophocolea minor Nees.

On shaded banks and rocks, especially in limestone regions. Hartford: Farmington and Hartford, *Miss Lorenz.* Tolland: Stafford, *Nichols.* Fairfield: Sherman, *Evans.* New Haven: East Haven, *Evans;* New Haven (1877), *J. A. Allen.*

New Brunswick to British Columbia, south to New York and Minnesota; Europe; Asia.

Exsic. Underwood & Cook, Hep. Amer. No. 129.

Ref. Evans, **28**, 172.

Chiloscyphus Corda

Leaf cells usually less than 0.03 mm. in diameter; lobes of perianth entire or nearly so	**C. polyanthus**
Leaf cells mostly 0.035-0.04 mm. in diameter; lobes of perianth dentate or lacerate	**C. pallescens**

Chiloscyphus polyanthus (L.) Corda.

In swamps and streams, often submerged. Litchfield: Winchester, *Evans.* Hartford: Windsor, *Evans.* Tolland: Bolton and Stafford, *Nichols.* Windham: Canterbury, *Mrs. Hadley.* New Haven: Bethany (1878), *Eaton;* Hamden, *Harger;* New Haven, *Evans;* Oxford, *Harger;* Woodbridge, *J. A. Allen.* Middlesex: Killingworth, *Nichols;* Middletown, *Evans.*

Labrador to Alaska, and south to New Jersey, Missouri, and California; Europe; Asia.

Ref. Eaton, **15**, 70. Evans, **28**, 171.

Chiloscyphus pallescens (Ehrh.) Dumort. *C. ascendens* Sulliv.

On rotten logs and shaded banks. May and June. Litchfeld: Salisbury, *Evans.* New Haven: Bethany (1875), *Eaton;* Hamden, *J. A. Allen;* Middlebury, *Evans;* New Haven, *Harger;* Orange, *Eaton;* Oxford, *Harger;* Woodbridge, *Evans.*

Ontario to British Columbia, south to New England, New York, and Indiana; Europe; Asia.

REF. Eaton, **15**, 70. Evans, **28**, 171; **31**, 54.

Harpanthus Nees

Harpanthus scutatus (Web. f. & Mohr) Spruce.

On rotten logs. LITCHFIELD: Salisbury, *Evans.* TOLLAND: Stafford, *Nichols.* NEW HAVEN: Branford and Cheshire, *Evans;* Oxford (1890), *Harger.*

Labrador west to British Columbia and south to Virginia; Europe; Asia.

REF. Evans, **28**, 171.

Geocalyx Nees

Geocalyx graveolens (Schrad.) Nees.

On rotten logs, banks, and shaded rocks. May and June. LITCHFIELD: New Milford and Salisbury, *Evans.* HARTFORD: Windsor, *Evans.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Redding, *Miss Haynes.* NEW HAVEN: Beacon Falls, *Evans;* Hamden, *J. A. Allen;* New Haven (1867), *Veitch;* North Branford and North Haven, *Evans;* Oxford, *Harger;* Woodbridge, *Eaton.*

Nova Scotia to British Columbia, south to Virginia and Washington; Europe; Asia.

REF. Eaton, **15**, 70. Evans, **28**, 171.

Cephalozia Dumort.

1. Stems bounded by a layer of enlarged cortical cells...... 2
Stems uniform in cell structure; lobes of leaves obtuse or obtusely pointed .... **C. fluitans**

2. Leaves inflated at the base, the segments ending in long slender points .... **C. curvifolia**
Leaves not inflated at the base, the segments acute or acuminate 3

3. Leaves not decurrent, symmetrical, the segments straight or scarcely connivent .... **C. bicuspidata**
Leaves more or less decurrent, unsymmetrical, the segments connivent 4

4. Leaf cells 0.04-0.045 mm. in diameter........ **C. connivens**
Leaf cells 0.02-0.03 mm. in diameter........ 5

5. Leaf cells thin-walled; segments of bracts entire or sparingly laciniate .... **C. lunulæfolia**
Leaf cells with uniformly thickened walls; segments of bracts dentate or denticulate .... **C. serriflora**

Cephalozia curvifolia (Dicks.) Dumort.

On rotten logs. May and June. LITCHFIELD: Goshen, *Underwood;* Salisbury, *Evans.* HARTFORD: Windsor, *W. E. Britton.* FAIRFIELD: Monroe and Newtown, *Harger.* NEW HAVEN: Beacon Falls, *Nichols;* Branford, *Evans;* Cheshire, *Harger;* Hamden (1877) and New Haven, *J. A. Allen;* North Haven and Woodbridge, *Evans.*

Newfoundland to Ontario, south to North Carolina and Minnesota; Europe; Asia.

REF. Eaton, 15, 71. Evans, 28, 171.

Cephalozia bicuspidata (L.) Dumort.

On shaded banks and rocks. May and June. LITCHFIELD: Salisbury, *Nichols.* TOLLAND: Stafford, *Nichols.* FAIRFIELD: Trumbull (1891), *Evans.* NEW HAVEN: Beacon Falls, Hamden, Naugatuck, and Orange, *Evans.*

Greenland to Alaska, and south to New England, Minnesota, and California; Asia; northern Africa.

REF. Eaton, 15, 71 (quoted from East Haven). Evans, 28, 171.

Cephalozia connivens (Dicks.) Lindb.

In swamps and wet pastures. May and June. LITCHFIELD: Salisbury, *Evans.* FAIRFIELD: Sherman, *Evans.* NEW HAVEN: East Haven and Hamden, *Evans.* New Haven (1867), *Eaton;* North Branford, *Evans.*

Prince Edward Island to Ontario, and south to Florida; Europe; Asia.

REF. Eaton, 15, 71. Evans, 28, 171. Howe, 49, 282.

Cephalozia lunulæfolia Dumort.

On shaded banks and rotten logs. May and June. LITCHFIELD: Salisbury and Woodbury, *Evans.* HARTFORD: Windsor, *Evans.* TOLLAND: Bolton and Stafford, *Nichols.* FAIRFIELD: Huntington and Redding, *Evans.* NEW HAVEN: Beacon Falls and Hamden, *Evans;* New Haven (1866), *Eaton;*

North Branford, *Evans;* North Haven, *Nichols.* MIDDLESEX: Durham, *Evans.*

Greenland to Alaska, and south to Florida, Minnesota, and California; Europe; Asia.

REF. Evans, **28,** 171.

Cephalozia serriflora Lindb. *C. catenulata* of some authors.

On rotten logs. NEW HAVEN: New Haven (1892), *Evans.*

Nova Scotia to British Columbia, south to Florida and Louisiana; Europe; Asia.

REF. Evans, **28,** 171; **30,** 173.

Cephalozia fluitans (Nees) Spruce.

In wet bogs. LITCHFIELD: Salisbury and Woodbury, *Evans.* NEW HAVEN: Bethany (1888), *Harger.*

Labrador to British Columbia, south to New Jersey, Minnesota, and Washington; Europe; Asia.

EXSIC. Underwood & Cook, Hep. Amer. No. 154.

REF. Evans, **28,** 171.

Cephaloziella (Spruce) Schiffn.

Dioicous	**C. divaricata**
Monoicous (paroicous)	**C. myriantha**

Cephaloziella divaricata (Sm.) Schiffn. *Cephalozia divaricata* Dumort. 3/25/

On damp banks, sandy soil, and rocks. May and June. LITCHFIELD: Goshen, *Underwood.* HARTFORD: Hartford and West Hartford, *Miss Lorenz.* TOLLAND: Vernon, *Nichols.* FAIRFIELD: Huntington and Redding, *Evans.* NEW HAVEN: East Haven, *Evans;* Hamden (1877) and New Haven, *J. A. Allen;* North Haven, *Evans;* Orange, *J. A. Allen;* Oxford, *Harger;* Seymour, *Evans.* MIDDLESEX: Middlefield, *Evans.*

Greenland to Alaska, south to Maryland, Minnesota, and California; Europe; Asia.

EXSIC. Underwood & Cook, Hep. Amer. No. 155.

REF. Eaton, **15,** 71. Evans, **28,** 171.

Cephaloziella myriantha (Lindb.) Schiffn.

On sandy soil and rocks. HARTFORD: East Granby and West Hartford (1907), *Miss Lorenz.*

New England and New York; range in North America not definitely known; Europe.

Odontoschisma Dumort.

Leaves bordered by one to three rows of rectangular cells; gemmæ none .... **O. prostratum**

Leaves uniform in cell structure; gemmæ usually abundant, borne at the tips of erect shoots with rudimentary leaves **O. denudatum**

Odontoschisma prostratum (Sw.) Trevis. *O. Sphagni* of some authors.

In swamps and bogs. HARTFORD: West Hartford, *Miss Lorenz.* TOLLAND: Columbia, *Weatherby.* WINDHAM: Canterbury, *Mrs. Hadley.* NEW HAVEN: Hamden (1866) and New Haven, *Eaton;* North Branford, *Evans;* Oxford, *Harger.* NEW LONDON: Waterford, *Miss Lorenz.*

Southern New England, south into tropical America.

REF. Eaton, **15**, 71. Evans, **28**, 172; **29**, 344, *pl. 19, f. 42-54, pl. 20, f. 55, 57, 59, 60, 63, 64.*

Odontoschisma denudatum (Mart.) Dumort.

On rotten logs, more rarely on shaded banks. LITCHFIELD: Salisbury, *Evans.* HARTFORD: Windsor, *Evans.* TOLLAND: Bolton and Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* NEW HAVEN: Hamden, *O. D. Allen;* North Branford (1881), *J. A. Allen.*

Greenland to Nova Scotia and Ontario, south into tropical America; Europe; Asia.

REF. Evans, **28**, 172; **29**, 342, *pl. 19, f. 35-38.*

Calypogeia Raddi

1. Leaves rounded to obtuse at the apex, rarely bifid or bidentate; leaf cells with a smooth cuticle.............. 2

Leaves sharply bidentate; leaf cells with a minutely striate-verruculose cuticle .... **C. Sullivantii**

2. Leaf cells without trigones 3

Leaf cells with small but distinct trigones................ 4

3. Plants robust, growing on banks, earth in woods, or shaded rocks; underleaves bifid about one-third.....**C. Trichomanis**
Plants delicate, growing in bogs, underleaves bifid to the middle or beyond ....**C. tenuis**

4. Growing in bogs; leaves spreading at an angle of about 30° **C. sphagnicola**
Growing on rotten logs; leaves spreading at an angle of about 45° ....**C. suecica**

Calypogeia Trichomanis (L.) Corda. *Kantia Trichomanis* S. F. Gray.

On shaded banks and earth in woods. May and June. LITCHFIELD: Salisbury and Woodbury, *Evans*. HARTFORD: Windsor, *Evans*. TOLLAND: Bolton, *Nichols;* Coventry, *Mrs. Phelps;* Stafford and Vernon, *Nichols*. WINDHAM: Canterbury, *Mrs. Hadley;* Windham, *Nichols*. FAIRFIELD: Huntington, *Evans;* Redding, *Miss Haynes*. NEW HAVEN: Beacon Falls, *Evans;* Hamden (1877), *J. A. Allen;* Meriden, Naugatuck, New Haven, and Orange, *Evans*. MIDDLESEX: Killingworth, *Nichols*. NEW LONDON: Ledyard, *Nichols*.

Labrador to Alaska, and south to North Carolina and California; Europe; Asia.

REF. Eaton, **15**, 70. Evans, **28**, 171; **33**, 70.

Calypogeia tenuis (Aust.) Evans.

In bogs. LITCHFIELD: Woodbury (1902), *Evans*.

New Hampshire to New Jersey.

REF. Evans, **33**, 69, *pl. 73, f. 9-14*.

Calypogeia sphagnicola (Arn. & Perss.) Warnst. & Loeske.

In bogs. LITCHFIELD: New Milford (1906), *Evans*.

The only known locality outside of Europe.

REF. Evans, **33**, 65.

Calypogeia suecica (Arn. & Perss.) C. Müll. Frib.

On rotten logs. TOLLAND: Stafford (1906), *Nichols*.

Maine to Connecticut; Europe; range not yet definitely known.

REF. Evans, **33**, 66.

Calypogeia Sullivantii Aust. *Kantia Sullivantii* Underw.

On sandy banks. NEW HAVEN: East Haven, *Evans;* Milford, *Weatherby;* Woodbridge (1890), *Evans.* NEW LONDON: Waterford, *Miss Lorenz.*

Southern New England to North Carolina and Arkansas.

REF. Evans, **26,** 212; **28,** 171; **33,** 67.

Bazzania S. F. Gray

Plants large, the leaves often 2.5 mm. long, broadly ovate, truncate and tridentate at the apex............**B. trilobata**

Plants smaller, the leaves mostly 0.7 to 1.2 mm. long, ovate, acute or irregularly bidentate or tridentate at the apex **B. tricrenata**

Bazzania trilobata (L.) S. F. Gray. *Mastigobryum trilobatum* Nees.

On earth in woods and swamps, on shaded banks, and on rotten logs. Autumn. LITCHFIELD: Goshen, *Underwood;* New Milford and Salisbury, *Evans.* HARTFORD: Canton, *Nichols;* Glastonbury, *Mrs. Lowe;* West Hartford, *Miss Lorenz.* TOLLAND: Ellington and Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley;* Windham, *Nichols.* FAIRFIELD: Redding, *Miss Haynes.* NEW HAVEN: Beacon Falls and Branford, *Evans;* Hamden (1855), *Eaton;* Naugatuck, *Evans;* North Haven, *Nichols;* Orange, *Eaton;* Oxford, *Harger;* Seymour, *Evans;* Woodbridge, *Hall.* MIDDLESEX: Durham and Killingworth, *Evans.* NEW LONDON: Groton and North Stonington, *C. B. Graves.*

Newfoundland to Ontario, and south to Alabama; Europe; Asia.

REF. Eaton, **15,** 70. Evans, **28,** 171.

Bazzania tricrenata (Wahl.) Trevis. *B. triangularis* (Schleich.) Lindb.

On shaded rocks. LITCHFIELD: Salisbury (1892), *Evans.* FAIRFIELD: Redding, *Evans.* NEW HAVEN: Beacon Falls and Naugatuck, *Evans.*

Nova Scotia to Alaska, and south to North Carolina and Washington; Europe; Asia.

REF. Evans, **28,** 171.

Lepidozia Dumort.

1. Leaves divided to the middle or a little beyond into three or four triangular lobes ....**L. reptans**
   Leaves divided almost to the base into three or four setaceous divisions 2
2. Underleaves of stem mostly quadrifid with subequal divisions; bracts mostly trifid or quadrifid........**L. setacea**
   Underleaves of stem mostly trifid, one or two of the divisions regularly aborted; bracts mostly bifid....**L. sylvatica**

Lepidozia reptans (L.) Dumort.

On shaded banks and rotten logs. May and June. LITCHFIELD: Goshen, *Underwood;* Salisbury, *Evans.* HARTFORD: Canton, *Nichols.* WINDHAM: Windham, *Nichols.* NEW HAVEN: Beacon Falls, *Evans;* Hamden, *Eaton;* Naugatuck, *Evans;* New Haven, *J. A. Allen;* North Haven, *Evans;* Orange (1877), *J. A. Allen;* Oxford, *Harger;* Woodbridge, *J. A. Allen.*

Newfoundland to Alaska, and south to Virginia, Minnesota, and California; Europe; Asia.

REF. Eaton, **15**, 70. Evans, **28**, 172.

Lepidozia setacea (Web.) Mitt. *L. sphagnicola* Evans.

In bogs. May and June. NEW HAVEN: Bethany (1892), *Evans.*

Range in North America not definitely known; Europe; Asia.

EXSIC. Underwood & Cook, Hep. Amer. No. 168 (as *L. sphagnicola*).

REF. Evans, **20**, 308, *pl. 162;* **28**, 172; **30**, 186.

Lepidozia sylvatica Evans. *L. setacea* of some authors.

On shaded banks and rotten logs. May and June. HARTFORD; Manchester, *Miss Lorenz.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* NEW HAVEN: East Haven, *Evans;* Hamden (1866) *Eaton;* Naugatuck, *Evans;* New Haven, *Veitch;* Orange, *Eaton;* Oxford, *Harger.* MIDDLESEX: Killingworth, *Hall.*

New England to Florida.

EXSIC. Underwood & Cook, Hep. Amer. No. 85 (as *L. setacea*).

REF. Eaton, 15, 70. Evans, **28**, 172; **30**, 187, *pl. 57*.

Blepharostoma Dumort.

Blepharostoma trichophyllum (L.) Dumort.

On shaded banks and rocks, also on rotten logs. May and June. TOLLAND: Stafford, *Nichols*. FAIRFIELD: Sherman, *Evans*. NEW HAVEN: Beacon Falls, *Evans*; New Haven, *J. A. Allen*; Orange, *Evans*. MIDDLESEX: Killingworth (1875), *Hall*.

Greenland to Alaska, and south to New Jersey, Colorado, and California; Europe; Asia.

REF. Eaton, 15, 70. Evans, **28**, 171.

Ptilidium Nees

Stems erect or ascending; stem leaves distant or loosely imbricated .... **P. ciliare**

Stems prostrate; stem leaves densely imbricated........ **P. pulcherrimum**

Ptilidium ciliare (L.) Nees. *Blepharozia ciliaris* Dumort.

On earth among rocks. May and June. LITCHFIELD: Cornwall and Goshen, *Underwood*. NEW HAVEN: East Haven, *Evans*; Hamden (1877), *J. A. Allen*; Meriden, *Miss Lorenz*. MIDDLESEX: Durham, *Evans*. NEW LONDON: Norwich, *C. B. Graves*.

Greenland to Alaska, and south to New England and Minnesota; Europe; Asia.

REF. Eaton, 15, 70. Evans, **28**, 172; **32**, 44.

Ptilidium pulcherrimum (Web.) Hampe. Included under *P. ciliare* by many writers.

On shaded rocks, trunks of trees, and rotten logs; rarely on banks rich in humus. May and June. LITCHFIELD: Cornwall and Goshen, *Underwood*; New Milford and Salisbury, *Evans*. HARTFORD: Burlington and Canton, *Nichols*; TOLLAND: Ellington, *Pease*; Stafford, *Nichols*. WINDHAM: Canterbury, *Mrs. Hadley*. FAIRFIELD: Redding and Sherman, *Evans*. NEW HAVEN: Beacon Falls, *Evans*; Bethany, Hamden, and Meriden (1856), *Eaton;* New Haven, North Haven, and Seymour, *Evans;* Woodbridge, *J. A. Allen.* MIDDLESEX: Durham, *Evans.*

Nova Scotia to Alaska, and south to Virginia, Minnesota, and Montana; Europe; Asia.

REF. Evans, **32**, 43.

Trichocolea Dumort.

Trichocolea tomentella (Ehrh.) Dumort.

On earth and banks in wooded swamps. LITCHFIELD: Norfolk, *Miss Lorenz;* Salisbury, *Evans.* HARTFORD: Windsor, *Evans.* FAIRFIELD: Danbury, *Eaton.* NEW HAVEN: Beacon Falls and Branford, *Evans;* East Haven, Hamden, and New Haven (1865), *Eaton;* Orange and Woodbridge, *Evans.* MIDDLESEX: East Haddam, *C. B. Graves;* Killingworth, *Hall.*

Newfoundland to Ontario, and south to North Carolina; Europe; Asia.

REF. Eaton, **15**, 70. Evans, **28**, 173.

Diplophylleia Trevis.

Ventral lobe apiculate; monoicous (autoicous)....**D. apiculata**
Ventral lobe rounded; dioicous...................**D. taxifolia**

Diplophylleia apiculata Evans. *Scapania albicans* var. *taxifolia* (Wahl.) Aust. *Scapania albicans* var. *taxifolia minor* Aust.

On shaded banks, more rarely on rocks. May and June. LITCHFIELD: New Milford and Salisbury, *Evans.* HARTFORD: Burlington and Canton, *Nichols;* Hartford, *Miss Lorenz.* TOLLAND: Bolton and Vernon, *Nichols.* FAIRFIELD: Huntington, *Evans;* Redding, *Howe.* NEW HAVEN: Beacon Falls, *Evans;* Hamden, *O. D. Allen;* Madison, Meriden, Naugatuck, North Haven, Orange, and Seymour, *Evans;* Woodbridge, *Eaton.* MIDDLESEX: Killingworth, *Hall* (1876).

Southern New England to Georgia.

EXSIC. Miss Haynes, Amer. Hep. No. 33.

REF. Eaton, **15**, 71. Evans, **27**, 373, ✓*pl. 12.* **28**, 171.

Diplophylleia taxifolia (Wahl.) Trevis.

On shaded rocks. LITCHFIELD: Salisbury (1890), *Evans.* NEW HAVEN: Branford, *Evans.*

Newfoundland to Alaska, south to New England, Idaho, and Washington; Europe; Asia.

REF. Evans, 28, 171.

Scapania Dumort.

1. Ventral lobe obtuse, acute, or apiculate, mostly entire.... 2
Ventral lobe rounded 3

2. Growing on earth or rocks; stems usually less than 2 cm. long .... **S. curta**
Growing in bogs; stems mostly 2-10 cm. long...... **S. irrigua**

3. Growing on rocks or banks; leaves mostly toothed or ciliate 4
Growing on wet rocks, usually in streams; leaves mostly entire, the dorsal lobe arching beyond stem; leaf cells thin-walled .... **S. undulata**

4. Bright green, varying to yellowish or brownish; dorsal lobe arching beyond stem; leaf cells with uniformly thickened walls except near base; leaf margins mostly ciliate .... **S. nemorosa**
More or less tinged with red; dorsal lobe scarcely arching across stem; leaf cells with thin walls but with more or less evident trigones; leaf margins mostly dentate **S. dentata**

Scapania curta (Mart.) Dumort.

On rocks. NEW HAVEN: Meriden (1907), *Miss Lorenz.*

Greenland to Alaska, south to Maryland and California; Europe; Asia.

Scapania irrigua (Nees) Dumort.

In bogs. LITCHFIELD: Winchester, *Evans.* NEW HAVEN: Bethany (1892), *Evans.*

Greenland to Alaska, south to New Jersey and British Columbia; Europe; Asia.

EXSIC. Underwood & Cook, Hep. Amer. No. 190 (Bethany, *F. Bement,* incorrectly labeled, "Lebanon, Ct.").

REF. Evans, 28, 172. Müller, 60, 80.

Scapania nemorosa (L.) Dumort.

On rocks and banks. May and June. LITCHFIELD: Goshen, *Underwood;* Salisbury, *Evans.* HARTFORD: Hartford, *Miss Lorenz;* Southington, *Chamberlain.* TOLLAND: Bolton, Stafford, and Vernon, *Nichols.* WINDHAM: Plainfield, *Sheldon;* Windham, *Nichols.* FAIRFIELD: Bridgeport, *Miss Lorenz;* Huntington, *Evans;* Redding, *Miss Haynes.* NEW HAVEN: Beacon Falls, Bethany, and Branford, *Evans;* Hamden, *Eaton;* Meriden and Naugatuck, *Evans;* New Haven (1855), *Eaton;* Orange, *Evans;* Oxford, *Harger;* Seymour, *Evans;* Woodbridge, *Hall.* MIDDLESEX: Killingworth and Middletown, *Evans.* NEW LONDON: Norwich, *C. B. Graves.*

Nova Scotia to Alaska, south to Georgia, Louisiana, and California; Europe.

REF. Eaton, **15**, 71. Evans, **28**, 172. Müller, **60**, 173.

Scapania dentata Dumort.

On damp rocks. HARTFORD: Burlington (1908), *Nichols.*

New England, Minnesota, Montana, British Columbia, and California; Europe; Asia; range in North America not definitely known.

Scapania undulata (L.) Dumort.

On wet rocks, usually in streams. LITCHFIELD: Salisbury, *Miss Lorenz.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Redding, *Miss Haynes.* NEW HAVEN: Beacon Falls, *A. H. Graves;* Hamden, *Eaton;* North Branford, *Evans;* Woodbridge (1878), *J. A. Allen.* MIDDLESEX: Chester, *Nichols.* NEW LONDON: Montville, *C. B. Graves.*

Greenland to Alaska, south to Florida, Missouri, and California; Europe; Asia.

REF. Evans, **28**, 173. Müller, **60**, 133.

Radula Dumort.

1. Plants pale or bright green; ventral lobes of stem leaves not arching across axis, attached by a long and almost longitudinal line; leaf cells thin-walled throughout or with very indistinct trigones; monoicous (usually paroicous) **2**

Plants often tinged with brown; ventral lobes of stem leaves arching partially or wholly across the axis, and attached by a short oblique line; leaf cells with distinct trigones; dioicous .... **R. tenax**

2. Subfloral innovations usually none.............. **R. complanata**
   Subfloral innovations single or double............ **R. obconica**

Radula complanata (L.) Dumort.

On rocks and trunks of trees. May and June. LITCHFIELD: Goshen, *Underwood;* New Milford, *Evans.* HARTFORD: Windsor, *W. E. Britton.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Redding, *Miss Haynes;* Sherman, *Evans.* NEW HAVEN: Cheshire, *Harger;* Hamden and New Haven (1866), *Eaton;* North Haven, Orange, and Seymour, *Evans.* MIDDLESEX: Killingworth and Middlefield, *Evans.*

REF. Eaton, 15, 70. Evans, 28, 172.

Quebec to Alaska, south to Florida, Louisiana, and California; Europe; Asia; northern Africa.

Radula obconica Sull.

On shaded rocks in ravines. FAIRFIELD: Redding, *Evans.* NEW HAVEN: Hamden (1891), *Evans;* Oxford, *Harger.* MIDDLESEX: Killingworth, *Nichols.*

Connecticut west to Ohio and south to Georgia.

REF. Evans, 26, 213; 28, 172.

Radula tenax Lindb.

On shaded rocks. LITCHFIELD: Salisbury, *Miss Lorenz;* FAIRFIELD: Redding, *Miss Haynes.* NEW HAVEN: Branford and Naugatuck (1890), *Evans.*

New England to North Carolina.

REF. Evans, 28, 172.

Porella (Dill.) L.

1. Ventral lobes lingulate-oblong, closely appressed to the stem or to the dorsal lobes...................... **P. pinnata**
   Ventral lobes broadly ovate to oblong.................... 2
2. Ventral lobes slightly or not at all decurrent; underleaves contiguous or slightly imbricated............. **P. platyphylla**
   Ventral lobes long-decurrent; underleaves distant. . **P. rivularis**

Porella pinnata L. *Madotheca Porella* Dumort.

On stones and trunks of trees, subject to inundation. LITCHFIELD: Goshen, *Underwood.* HARTFORD: Granby, *Nichols.* FAIRFIELD: Danbury, *Nichols;* Greenwich, *Miss Haynes;* Redding, *Evans.* NEW HAVEN: Cheshire, *Nichols;* East Haven (1859), *Eaton;* Hamden, *J. A. Allen;* New Haven, *Eaton;* North Branford and Orange, *Evans.* MIDDLESEX: Killingworth, *Hall;* Middlefield, *Evans.*

Nova Scotia to Ontario, south to Georgia and Louisiana; Europe.

EXSIC. Underwood & Cook, Hep. Amer. No. 9.

REF. Eaton, 15, 70. Evans, 28, 172.

Porella platyphylla (L.) Lindb. *Madotheca platyphylla* Dumort.

On shaded rocks and trunks of trees. May and June. LITCHFIELD: Goshen, *Underwood;* New Milford and Salisbury, *Evans.* HARTFORD: Southington, *Chamberlain;* Windsor, *W. E. Britton.* TOLLAND: Bolton, Stafford, and Vernon, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley;* Killingly, *Rounds;* Plainfield, *Sheldon;* Windham, *Nichols.* FAIRFIELD: Danbury, *Eaton;* Redding, *Miss Haynes;* Sherman, *Evans.* NEW HAVEN: Bethany, East Haven, and Hamden (1858), *Eaton;* Meriden, *Evans;* New Haven, *Eaton;* Orange, *Evans;* Oxford, *Harger.* MIDDLESEX: Killingworth, *Hall.* NEW LONDON: East Lyme, *C. B. Graves.*

Nova Scotia west to Alaska and south to Georgia and Missouri; Europe; Asia; northern Africa.

REF. Eaton, 15, 70. Evans, 28, 172. Howe, 47, 522.

Porella rivularis (Nees) Trevis.

On shaded rocks. NEW HAVEN: Cheshire (1856), *Eaton.*

Connecticut and Ohio, south to Texas and New Mexico, west to California, British Columbia, and Alaska; Europe.

REF. Barbour, 6, 35. Evans, 28, 172. Howe, 47, 520.

Cololejeunea (Spruce) Schiffn.

Cololejeunea Biddlecomiæ (Aust.) Evans. *Lejeunea echinata* and *L. calcarea* of some authors.

On rocks and trees. May and June. LITCHFIELD: Goshen, *Underwood;* Salisbury, *Evans.* HARTFORD: Manchester and West Hartford, *Miss Lorenz.* FAIRFIELD: Sherman, *Nichols.* NEW HAVEN: Bethany, *Evans;* Hamden (1877) and New Haven, *J. A. Allen.*

New England to Ontario, south to Florida and Alabama.

REF. Eaton, **15**, 70. Evans, **25**, 169; **28**, 171.

Lejeunea Libert

Lejeunea cavifolia (Ehrh.) Lindb. *L. serpyllifolia* Libert.

On shaded rocks and trees. May and June. LITCHFIELD: Salisbury, *Nichols.* FAIRFIELD: Redding and Trumbull, *Evans.* NEW HAVEN: Branford, *Evans;* Hamden and New Haven, *J. A. Allen;* Orange, *Evans;* Oxford, *Harger;* Seymour, *Evans.* MIDDLESEX: Killingworth (1875), *Hall;* Middletown, *Evans.*

New England west to Ontario and Minnesota and south to Pennsylvania; Europe; Asia.

REF. Eaton, **15**, 70. Evans, **25**, 152; **28**, 171.

Leucolejeunea Evans

Leucolejeunea clypeata (Schwein.) Evans. *Phragmicoma clypeata* Nees. *Archilejeunea clypeata* Schiffn.

On rocks and trees. May and June. LITCHFIELD: New Milford and Salisbury, *Evans.* FAIRFIELD: Redding, *Evans.* NEW HAVEN: Cheshire, *Harger;* Hamden, *J. A. Allen;* Meriden, *Miss Lorenz;* New Haven and North Haven, *Evans;* Oxford, *Harger;* Seymour and Woodbridge, *Evans.* MIDDLESEX: Killingworth (1875), *Hall.*

Southern New England and New York, south to Georgia and Louisiana.

REF. Barbour, **7**, 29. Eaton, **15**, 70. Evans, **25**, 124, *pl. 16, f. 1-11;* **28**, 171.

Jubula Dumort.

Jubula pennsylvanica (Steph.) Evans. *Frullania* and *Jubula Hutchinsiæ* of some authors.

On damp, often dripping, rocks. LITCHFIELD: Goshen, *Underwood;* Salisbury, *Evans.* HARTFORD: Windsor, *Evans.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley;* Windham, *Nichols.* FAIRFIELD: Redding, *Miss Haynes.* NEW HAVEN: Beacon Falls and Cheshire, *Evans;* Derby, *J. A. Allen;* Hamden (1866), *Eaton;* Naugatuck, *Evans;* Woodbridge, *Hall.* MIDDLESEX: Middletown, *Evans.*

Nova Scotia to Georgia and Tennessee.

EXSIC. Underwood & Cook, Hep. Amer. No. 100 (as *J. Hutchinsiæ* var. *Sullivantii*). Miss Haynes, Amer. Hep. No. 34.

REF. Eaton, 15, 69. Evans, 28, 171; 31, 56.

Frullania Raddi

1.	Ventral lobes about as broad as long; leaves without ocelli	2
	Ventral lobes distinctly longer than broad; leaves with ocelli	6
2.	Underleaves cordate at base	**F. plana**
	Underleaves not cordate at base	3
3.	Leaves strongly squarrose when moist	**F. squarrosa**
	Leaves scarcely or not at all squarrose	4
4.	Ventral lobes usually explanate	**F. riparia**
	Ventral lobes usually inflated	5
5.	Underleaves dentate or crenate above the middle	**F. Brittoniæ**
	Underleaves entire or unidentate on the sides	**F. eboracensis**
6.	Dorsal lobes rounded or very obtuse	**F. Asagrayana**
	Dorsal lobes more or less sharp-pointed	**F. Tamarisci**

Frullania riparia Hampe.

On shaded rocks, especially limestone. LITCHFIELD: New Milford, *Evans;* Salisbury, *Nichols.* FAIRFIELD: Sherman and Trumbull (1891), *Evans.* NEW HAVEN: Orange, *Evans.*

New England to Minnesota, south to Tennessee; Europe; Asia.

REF. Evans, 22, *pl. 5, f. 1, 4, 5;* 28, 171.

Frullania squarrosa (R. Bl. & N.) Dumort.

On rocks and trees. NEW HAVEN: East Haven (1890), *Evans.*

Connecticut to Ohio, and south into the tropics of South America; Asia; Africa; Australia.

REF. Barbour, **5**, 4. Evans, **22**, 15; **28**, 171.

Frullania Brittoniæ Evans.

On rocks and trees. May and June. LITCHFIELD: New Milford, *Evans*. NEW HAVEN: Hamden, *J. A. Allen;* Meriden, *Evans;* New Haven (1866), *Eaton*.

New England west to Illinois, south to Virginia.

REF. Barbour, **5**, 5. Evans, **22**, 16, *pl. 7, f. 1-12;* **28**, 171.

Frullania eboracensis Gottsche. Including *F. virginica* Gottsche.

On trees and rocks. May and June. LITCHFIELD: Cornwall, *Green;* Goshen, *Underwood;* New Milford and Salisbury, *Evans*. TOLLAND: Stafford and Vernon, *Nichols*. WINDHAM: Canterbury, *Mrs. Hadley;* Plainfield, *Sheldon*. FAIRFIELD: Greenwich, *Miss Haynes;* Huntington, *Nichols;* Sherman, *Evans*. NEW HAVEN: Bethany, *Evans;* East Haven, *Eaton;* Hamden, *Hall;* Milford, *Harger;* New Haven (1866), *Eaton;* North Haven, *J. A. Allen;* Orange, *Eaton;* Oxford, *Harger;* Woodbridge, *Eaton*. MIDDLESEX: Chester and Killingworth, *Nichols*. NEW LONDON: Groton, *C. B. Graves;* Ledyard, *Nichols*.

Nova Scotia to Manitoba, south to Florida.

REF. Eaton, **15**, 69. Evans, **28**, 171; **32**, 44.

Frullania plana Sull.

On shaded rocks. NEW HAVEN: Woodbridge (1890), *Evans*.

Connecticut and New York, south to New Jersey and Tennessee.

REF. Barbour, **4**, 5. Evans, **22**, 20; **28**, 171.

Frullania Asagrayana Mont. Sometimes called *F. Grayana*.

On rocks and trees. LITCHFIELD: New Milford and Salisbury, *Evans*. TOLLAND: Stafford, *Nichols*. WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Redding and Sherman, *Evans.* NEW HAVEN: East Haven, Madison, and Meriden, *Evans;* New Haven (1855), *Eaton;* Orange and Woodbridge, *Harger.* MIDDLESEX: Killingworth, *Hall.*

Newfoundland to Ontario, south to Georgia.

REF. Eaton, 15, 69. Evans, 28, 171.

Frullania Tamarisci (L.) Dumort.

On rocks and trees. NEW HAVEN: Seymour (1904), *Evans.*

Newfoundland to Connecticut; Europe; Asia. Range not definitely known in North America.

REF. EVANS, 33, 72.

ORDER ANTHOCEROTALES

FAMILY ANTHOCEROTACEÆ

Capsule scarcely projecting beyond the basal sheath; wall without stomata ....**Notothylas**
Capsule projecting far beyond the basal sheath; wall with distinct stomata ....**Anthoceros**

Notothylas Sull.

Notothylas orbicularis (Schwein.) Sull. *N. valvata* Sull.

On moist soil. Aug.-Nov. LITCHFIELD: Goshen, *Underwood.* NEW HAVEN: Cheshire and East Haven, *Evans;* Hamden (1877) and New Haven, *O. D. Allen;* Orange, *Evans.* MIDDLESEX: Middlefield, *Evans.* NEW LONDON: Norwich, *Setchell.*

New England to Indiana, south to North Carolina; South America (Galapagos Islands); Europe.

EXSIC. Underwood & Cook, Hep. Amer. No. 65.

REF. Eaton, 15, 69. Evans, 28, 173. Howe, 48, 22.

Anthoceros (Mich.) L.

Spores yellow ....**A. levis**
Spores dark brown or black.....................**A. punctatus**

Anthoceros levis L.

On moist ground and damp or wet rocks. Aug.-Nov. LITCHFIELD: Goshen, *Underwood.* NEW HAVEN: Hamden

(1855), *Eaton;* New Haven, *J. A. Allen;* North Branford, *Evans;* Oxford, *Harger;* Woodbridge, *Eaton.* MIDDLESEX: Cromwell, *Evans.* NEW LONDON: Lisbon, *Mrs. Hadley.*

New England and Ontario, south to the Gulf States and Mexico and west to Iowa; Europe; Asia.

REF. Eaton, **15**, 69. Evans, **28**, 173.

Anthoceros punctatus L.

On damp ground. Aug.-Nov. LITCHFIELD: Goshen, *Underwood.* WINDHAM: Plainfield, *Sheldon.* NEW HAVEN: East Haven, North Branford, and Orange, *Evans;* Oxford, *Harger;* Woodbridge (1879), *J. A. Allen.* MIDDLESEX: Middlefield, *Evans.*

Nova Scotia to Ohio, south to Florida and Louisiana; Europe.

REF. Evans, **28**, 173. Howe, **48**, 16.

[Subclass Musci]

ORDER SPHAGNALES

FAMILY SPHAGNACEÆ

Sphagnum (Dill.) L.

1. Cortical cells of stem and branches without spiral fibrils; branch leaves mostly truncate and toothed or fringed at the apex **2**

Cortical cells of stem and branches with spiral fibrils and pores; branch leaves densely imbricated, cucullate at the apex, not truncate, entire (CYMBIFOLIA, p. 80).......... **28**

2. Branches in fascicles of 3-6.............................. **3**

Branches in fascicles of 7-14; chlorophyll cells of branch leaves elliptical in cross section and enclosed toward both surfaces of the leaf by the hyaline cells* (POLYCLADA, p. 81)....................................**S. Wulfianum**

3. Chlorophyll cells mostly triangular to trapezoidal in cross section, either free at both surfaces of the leaf or enclosed toward one leaf surface by the hyaline cells, but always with the base free toward one of the two leaf surfaces **4**

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* What is said here regarding the form and position of the chlorophyll cells refers always to median cross sections of leaves taken from the middle of one of the spreading branches.

Chlorophyll cells elliptical, spindle-shaped, or rectangular in cross section, not triangular or trapezoidal (except in *S. dasyphyllum*) 20

4. Base toward the inner surface of the leaf; hyaline cells strongly convex toward the outer surface; branch leaves erect (ACUTIFOLIA, p. 83).............................. 5

Base toward the outer surface of the leaf; hyaline cells usually strongly convex toward the inner surface...... 13

5. Stem leaves lacerate-fringed at the broadly rounded apex, without fibrils 6

Stem leaves more or less truncate and toothed at the apex, not fringed 7

6. Stem leaves broadened above, spatulate, apex and upper margins fringed; monoicous ....**S. fimbriatum**

Stem leaves not broadened above, lingulate, fringed only at the apex; dioicous ....**S. Girgensohnii**

7. Stem leaves lingulate, fibrils usually absent, though sometimes present in the upper part of the leaf.............. 8

Stem leaves triangularly lingulate to equilaterally triangular, usually with fibrils 10

8. Plants usually red, never brown.......................... 9

Plants usually brown, never red; pores as in *S. Warnstorfii;* stem leaves without fibrils.......................**S. fuscum**

9. Pores present on outer surface of the branch leaves, small, round, and situated in the cell angles; stem leaves without fibrils ....**S. Warnstorfii**

Pores present on outer surface of the lower branch leaves, large, more or less semicircular, and situated along the lateral margins of the cells; stem leaves frequently with fibrils ....**S. rubellum**

10. Branch leaves when dry distinctly 5-ranked; outer wall of cortical cells in stem often with irregular pores in the upper ends of the cells....................**S. quinquefarium**

Branch leaves when dry not arranged in distinct rows.... 11

11. Stem leaves with fibrils and pores; branch leaves not glossy when dry 12

Stem leaves mostly without fibrils or pores; branch leaves glossy when dry; cortical cells of stem seldom with pores; hyaline cells of stem leaves usually 2-6-septate **S. subnitens**

12. Outer wall of cortical cells in stem often with irregular pores in the upper ends of the cells; hyaline cells of stem leaves not divided, or, if so, uniseptate..**S. acutifolium**

Cortical cells in stem without pores; hyaline cells of stem leaves copiously divided by oblique walls.......**S. tenerum**

13. Chlorophyll cells narrowly trapezoidal or rectangular in cross section, free at both surfaces, but with the surface walls strongly thickened (Squarrosa, p. 81)............ 14

Chlorophyll cells with the free walls scarcely, if at all, thickened; branch leaves erect-spreading* (Cuspidata, p. 82).. 15

14. Plants large, monoicous; branch leaves mostly squarrose from the middle ....**S. squarrosum**

Plants medium-sized, dioicous; branch leaves more or less imbricated, not squarrose ....**S. teres**

15. Chlorophyll cells triangular in cross section, often enclosed toward the inner leaf surface by the hyaline cells...... 17

Chlorophyll cells trapezoidal in cross section and free on both surfaces 16

16. Pores numerous on outer surface of the branch leaves, frequently large and usually in rows............**S. Dusenii**

Pores mostly lacking on outer surface of the branch leaves, when present, small and restricted to the angles of the cells ....**S. cuspidatum**

17. Cortex well differentiated from the central strand........ 18

Cortex not well differentiated from the central strand.... 19

18. Stem leaves lacerate-fringed at the apex......**S. Pulchricoma**

Stem leaves toothed at the apex...............**S. Torreyanum**

19. Pores on outer surface of the branch leaves in the apical half restricted to the angles of the cells......**S. recurvum**

Pores on outer surface of the branch leaves in the apical half occurring in the angles and also along the lateral margins of the cells.........................**S. parvifolium**

20. Chlorophyll cells enclosed toward one or both surfaces of the leaf by the hyaline cells, elliptical or spindle-shaped in cross section; branch leaves squarrose from the middle (Rigida, p. 81)................................ 21

Chlorophyll cells free toward both surfaces of the leaf; branch leaves more or less secund or falcate (Subsecunda, p. 85)... 22

21. Chlorophyll cells elliptical in cross section and enclosed toward both leaf surfaces by the hyaline cells...... **S. compactum**

Chlorophyll cells spindle-shaped in cross section and enclosed toward the inner surface of the leaf by the hyaline cells; the outer wall free, but very strongly thickened ....**S. Garberi**

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* *S. dasyphyllum* may be looked for here.

22. Chlorophyll cells trapezoidal in cross section; the walls not thickened, and the broad base toward the outer surface of the leaf; hyaline cells strongly convex toward the inner surface .... **S. dasyphyllum**

Chlorophyll cells barrel-shaped to rectangular in cross section, equally free toward both surfaces, and with the free walls usually thickened 23

23. Cortex of stem consisting of 2-several layers of cells.... 24

Cortex of stem consisting of one layer of cells........... 25

24. Stem leaves small, not more than 1 mm. long, fibrils present only near the apex; branch leaves secund.... **S. contortum**

Stem leaves larger, 1.5-2 mm. long, fibrils usually abundant throughout; branch leaves not secund......**S. platyphyllum**

25. Branch leaves with many pores, at least on the outer surface; pores frequently in bead-like rows............ 26

Branch leaves with very few or no pores............**S. obesum**

26. Pores few or lacking on the inner surface................ 27

Pores numerous on both surfaces, especially on the outer; stem leaves 1-2 mm. long.....................**S. rufescens**

27. Stem leaves less than 1 mm. long, hyaline cells rarely septate ....**S. subsecundum**

Stem leaves 1-1.5 mm. long, hyaline cells often septate **S. inundatum**

28. Chlorophyll cells of branch leaves usually free toward both surfaces of the leaf............................ 29

Chlorophyll cells of branch leaves enclosed by the hyaline cells, equidistant from both surfaces of the leaf, and elliptical in cross section; hyaline cells smooth or faintly papillose on the lateral walls............**S. medium**

29. Chlorophyll cells triangular or trapezoidal in cross section, the base toward the inner surface of the leaf and not thickened; hyaline cells strongly convex toward the outer surface 30

Chlorophyll cells more or less elliptical in cross section, cell cavity almost central, and both surface walls strongly thickened; hyaline cells more strongly convex toward the outer surface of the leaf than toward the inner surface, and papillose on the lateral walls...... **S. papillosum**

30. Chlorophyll cells broadly triangular to trapezoidal; hyaline cells with irregular bands of thickening on the lateral walls ....**S. imbricatum**

Chlorophyll cells narrowly triangular; hyaline cells smooth on the lateral walls......................**S. cymbifolium**

CYMBIFOLIA

Sphagnum imbricatum Hornsch.

HARTFORD: Canton, *Nichols.* TOLLAND: Stafford, *Nichols.* WINDHAM: Thompson, *Miller.* NEW HAVEN: East Haven and New Haven (1891), *Evans.* NEW LONDON: Voluntown, *Miller.*

Var. **affine** (Ren. & Card.) Warnst.

LITCHFIELD: Salisbury, *Nichols.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* NEW HAVEN: Beacon Falls, *Nichols;* East Haven (1875), *Eaton;* Hamden, New Haven, North Haven, Orange, and Woodbridge, *Evans.* MIDDLESEX: Killingworth, *Nichols.* NEW LONDON: Ledyard, *Nichols.*

Var. **subleve** Warnst.

LITCHFIELD: Salisbury, *Nichols.* NEW HAVEN: New Haven (1891), *Evans.*

Newfoundland and Labrador to Alaska, south to Louisiana; Europe; Asia.

EXSIC. Eaton & Faxon, Sphag. Bor.-Amer. No. 154 (var. *affine*).

REF. Andrews, 1, 62.

Sphagnum cymbifolium Ehrh.

LITCHFIELD: Salisbury, *Nichols.* TOLLAND: Ellington, *Pease.* FAIRFIELD: Norwalk, *Harger.* NEW HAVEN: Bethany and Branford, *Eaton;* East Haven and Hamden, *Evans;* New Haven (1878), *Eaton;* Oxford, *Harger.* NEW LONDON: Waterford, *Miss Lorenz.*

Var. **squarrosulum** Nees & Hornsch.

NEW HAVEN: Branford, *Eaton;* East Haven (1891), *Evans;* Hamden, *Eaton.*

Newfoundland and Labrador to Alaska, south to Florida and British Columbia; a cosmopolitan.

EXSIC. Eaton & Faxon, Sphag. Bor.-Amer. Nos. 156, 157 (var. *glaucescens*), 160, and 161 (var. *pallescens*).

REF. Andrews, 1, 62. Eaton, 15, 68.

Sphagnum papillosum Lindb.

TOLLAND: Stafford, *Nichols.* NEW HAVEN: East Haven (1891), *Evans.*

Newfoundland and Labrador to Alaska, south to Alabama and Washington; Europe.

Sphagnum medium Limpr.

LITCHFIELD: Salisbury, *Nichols.* TOLLAND: Stafford, *Nichols.* WINDHAM: Thompson, *Miller.* NEW HAVEN: Bethany, Hamden, and New Haven (1890), *Evans;* Oxford, *Harger.* NEW LONDON: Ledyard, *C. B. Graves.*

Newfoundland and Labrador to Alaska, south to Florida; South America; Europe; Asia.

EXSIC. Eaton & Faxon, Sphag. Bor.-Amer. Nos. 166 (var. *roseum*), 167 (var. *purpurascens*), and 168 (var. *versicolor*).

REF. Andrews, 1, 63.

RIGIDA

Sphagnum compactum DC.

In wet woods. NEW HAVEN: Beacon Falls (1907), *Nichols.*

Arctic America, Canada, and the northern United States; Europe; Asia; Madeira Islands.

Sphagnum Garberi Lesq. & James var. **squarrosulum** Warnst.

NEW HAVEN: Naugatuck (1905), *Evans.*

Newfoundland to Florida; Europe.

POLYCLADA

Sphagnum Wulfianum Girgens.

In swampy woods. LITCHFIELD: Salisbury (1907), *Nichols;* Winchester, *Miss Lorenz.*

Greenland to Connecticut, westward to the Rocky Mountains; Europe; Asia.

SQUARROSA

Sphagnum squarrosum Pers. var. **spectabile** Russ.

Deep wooded swamps. LITCHFIELD: Salisbury (1907), *Nichols.**

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* *S. squarrosum* was reported from Hamden by Hall in the Berzelius List (Eaton, **15**, 68), but the specimens have been lost sight of.

Arctic America, Canada, and the northern United States; Europe; Asia; Azores.

Sphagnum teres (Schimp.) Aongstr.

TOLLAND: Bolton (1906), *Nichols.* NEW HAVEN: Cheshire, *Nichols.*

Arctic America, Canada, and the northern United States; Europe; Asia.

CUSPIDATA

Sphagnum Pulchricoma C. Müll.

NEW LONDON: Ledyard (1884), *C. B. Graves;* Voluntown, *Miller.*

Connecticut to Florida and Louisiana; South America; Africa.

Sphagnum Torreyanum Sull. *S. cuspidatum* var. *Torreyanum* Braithw. and var. *miquelonense* Ren. & Card.

NEW HAVEN: Branford (1891), *Evans.* NEW LONDON: Voluntown, *Miller.*

REF. Andrews, 1, 62.

Sphagnum recurvum Beauv.

LITCHFIELD: Salisbury, *Nichols;* Woodbury, *Harger.* NEW HAVEN: East Haven and Hamden (1891), *Evans;* Oxford, *Harger.*

Var. **amblyphyllum** (Russ.) Warnst.

LITCHFIELD: Salisbury, *Nichols.* NEW HAVEN: Bethany, *Evans;* East Haven, *Eaton;* Hamden (1880), *J. A. Allen.*

Newfoundland and Labrador to Alaska, south to the Gulf of Mexico; a cosmopolitan.

EXSIC. Eaton & Faxon, Sphag. Bor.-Amer. Nos. 104 (var. *mucronatum*) and 107 (var. *amblyphyllum*). Warnstorf, Eur. Torfm. Serie IV, No. 263 (var. *mucronatum*).

REF. Andrews, 1, 63.

Sphagnum parvifolium (Sendt.) Warnst.

LITCHFIELD: Salisbury (1907), *Nichols.*

Probably has the same range as *S. recurvum.*

Sphagnum Dusenii C. Jens.

LITCHFIELD: Salisbury (1907), *Nichols.*

Newfoundland and Quebec to Connecticut and New York; Europe; Asia.

Sphagnum cuspidatum Ehrh.

Frequently submerged. LITCHFIELD: Salisbury, *Nichols;* Woodbury, *Harger.* NEW HAVEN: Bethany, *Eaton;* East Haven, *Evans;* Hamden (1880), *O. D. Allen;* Oxford, *Harger.*

Var. **falcatum** Russ.

NEW HAVEN: Bethany and Hamden (1892), *Evans.*

Var. **plumosum** Nees & Hornsch.

NEW HAVEN: Bethany and Hamden (1891), *Evans.*

Newfoundland to the Gulf of Mexico; a cosmopolitan.

EXSIC. Eaton & Faxon, Sphag. Bor.-Amer. Nos. 93 (var. *falcatum*), 96 (var. *submersum*), and 97 (var. *plumosum*).

REF. Andrews, 1, 62.

ACUTIFOLIA

Sphagnum fimbriatum Wils.

NEW HAVEN: Hamden (1891), *Evans.*

Arctic America, Canada, and the northern United States; South America; Europe; Asia.

EXSIC. Eaton & Faxon, Sphag. Bor.-Amer. No. 11 (var. *tenue*).

REF. Andrews, 1, 62.

Sphagnum Girgensohnii Russ.

LITCHFIELD: Norfolk (1875), *Eaton;* Salisbury, *Nichols.* NEW HAVEN: Hamden, *O. D. Allen.*

Arctic America, Canada, and the northern United States; Europe; Asia.

REF. Andrews, 1, 62. Cardot, 11, 305.

Sphagnum rubellum Wils. *S. tenellum* (Schimp.) Klinggr.

LITCHFIELD: Salisbury, *Nichols.* NEW HAVEN: Bethany (1892), *Evans;* Oxford, *Harger.*

Newfoundland and Labrador to Connecticut, westward to Alaska; Europe.

EXSIC. Eaton & Faxon, Sphag. Bor.-Amer. Nos. 29 and 31 (var. *versicolor*).

REF. Andrews, 1, 63. Cardot, 11, 409. Eaton, **18**, 3.

Sphagnum Warnstorfii Russ.

LITCHFIELD: Salisbury, *Nichols.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* NEW HAVEN: Hamden (1891), *Evans;* Middlebury, *Harger.*

Newfoundland to Connecticut, westward to the Pacific: Europe.

REF. Andrews, 1, 63. Cardot, 11, 419.

Sphagnum fuscum (Schimp.) Klinggr.

NEW HAVEN: New Haven (1893), *Eaton.*

Canada and the northern United States; Europe.

EXSIC. Eaton & Faxon, Sphag. Bor.-Amer. No. 35.

REF. Andrews, 1, 62. Eaton, **18**, 3.

Sphagnum quinquefarium (Lindb.) Warnst.

NEW HAVEN: Hamden and New Haven (1890), *Evans.*

Newfoundland to Connecticut, and southward along the Alleghany Mountains; Europe.

REF. Cardot, 11, 366. Eaton, **18**, 3.

Sphagnum subnitens Russ. & Warnst.

NEW HAVEN: Hamden (1891), *Evans;* New Haven, *Eaton.*

Var. **flavicomans** (Card.) Warnst.

NEW HAVEN: Bethany, East Haven (1891), and New Haven, *Evans.*

Newfoundland to New Jersey; Alaska; Azores; Europe; Asia; the variety found only in North America.

EXSIC. Eaton & Faxon, Sphag. Bor.-Amer. Nos. 51 (var. *flavicomans*) and 54 (var. *obscurum*).

REF. Andrews, 1, 63 (var. *flavicomans*). Cardot, 11, 399.

Sphagnum tenerum (Aust.) Warnst.

New Haven: East Haven and Hamden (1891), *Evans;* New Haven, *Eaton.*

Newfoundland to New Jersey; Europe.

Exsic. Eaton & Faxon, Sphag. Bor.-Amer. No. 60. Warnstorf, Eur. Torfm. Serie IV, No. 363.

Ref. Andrews, 1, 63. Cardot, 11, 410.

Sphagnum acutifolium Ehrh.

Litchfield: Salisbury, *Mrs. Phelps.* Hartford: Canton, *Nichols.* Tolland: Stafford, *Nichols.* New Haven: Bethany, *Eaton;* Branford, East Haven, and Hamden, *Evans;* New Haven (1865), *Eaton;* Oxford, *Harger.*

Throughout North America; Europe.

Exsic. Eaton & Faxon, Sphag. Bor.-Amer. Nos. 40 (var. *rubrum*), 44 (var. *versicolor*), 48 (var. *viride*), and 50 (var. *roseum*).

Ref. Andrews, 1, 62.

Subsecunda

Sphagnum dasyphyllum Warnst.

New Haven: New Haven (1891), *Evans.* This is the only known locality.

Exsic. Warnstorf, Eur. Torfm. Serie IV, No. 338.

Ref. Andrews, 1, 62. Cardot, 11, 287. Eaton, **18**, 7. Paris, **61**, 1189; **62**^{4}, 273. Renauld & Cardot, **65**, 68. Warnstorf, **78**, 176.

Sphagnum obesum (Wils.) Warnst.

Usually submerged or floating. Litchfield: Woodbury, *Harger.* New Haven: Branford (1891) and Hamden, *Evans;* Oxford, *Harger;* Woodbridge, *Evans.*

New Hampshire to Virginia; Europe.

Exsic. Eaton & Faxon, Sphag. Bor.-Amer. No. 127.

Ref. Andrews, 1, 63. Cardot, 11, 344. Paris, **62**^{4}, 289.

Sphagnum contortum Schultz. *S. laricinum* Spruce.

Litchfield: Woodbury, *Harger.* New Haven: New Haven (1891), North Branford, and Orange, *Evans;* Oxford, *Harger;* Prospect, *Eaton;* Woodbridge, *Evans.*

Massachusetts to Pennsylvania and probably southward; Europe.

EXSIC. Eaton & Faxon, Sphag. Bor.-Amer. No. 141.

REF. Andrews, 1, 62. Cardot, 11, 320.

Sphagnum platyphyllum (Lindb.) Warnst.

NEW HAVEN: New Haven (1891), *Evans.*

Massachusetts to Ohio; Europe.

REF. Andrews, 1, 63.

Sphagnum subsecundum Nees.

TOLLAND: Ellington (1876), *Pease.* WINDHAM: Thompson, *Miller.* FAIRFIELD: Danbury, *Nichols.* NEW HAVEN: Branford, Cheshire, East Haven, Hamden, and Orange, *Evans;* Oxford, *Eaton.*

Newfoundland to Ohio and Alabama; Europe; Asia.

EXSIC. Eaton & Faxon, Sphag. Bor.-Amer. Nos. 130 (var. *macrophyllum*) and 134 (var. *mesophyllum*).

REF. Andrews, 1, 63.

Sphagnum inundatum Russ.

LITCHFIELD: Salisbury, *Nichols.* TOLLAND: Stafford, *Nichols.* FAIRFIELD: Stratford (1906), *Nichols.* MIDDLESEX: Killingworth, *Nichols.*

Range probably the same as that of *S. subsecundum.*

Sphagnum rufescens (Nees & Hornsch.) Warnst.

Frequently submerged. NEW HAVEN: Hamden (1891) and New Haven, *Evans;* Oxford, *Eaton;* Woodbridge, *Evans.*

Newfoundland and Labrador to Alabama; Europe.

EXSIC. Eaton & Faxon, Sphag. Bor.-Amer. Nos. 142 and 143.

REF. Andrews, 1, 63. Eaton, 18, 7.

ORDER ANDREÆALES

FAMILY ANDREÆACEÆ

Andreæa Ehrh.

Midrib present	**A. Rothii**
Midrib wanting	**A. petrophila**

Andreæa petrophila Ehrh.

On non-calcareous rocks in mountainous or hilly regions. Summer. HARTFORD: Bloomfield, *Miss Lorenz.* NEW HAVEN: Meriden, *Miss Lorenz;* Woodbridge (1878), *J. A. Allen.*

Arctic America, Canada, and the northern United States; South America; Europe; Asia; Tasmania; New Zealand.

Andreæa Rothii Web. f. & Mohr.

On non-calcareous rocks in mountainous or hilly regions. Summer. LITCHFIELD: Salisbury, *Nichols.* NEW HAVEN: Beacon Falls, *Evans;* Branford, *Eaton;* Oxford, *Harger;* Woodbridge (1887), *Setchell.*

Newfoundland to Alabama and Tennessee; Greenland; Europe.

EXSIC. Renauld & Cardot, Musci Amer. Sept. No. 153.

ORDER BRYALES

Sporophyte borne at the apex of the stem or of a more or less elongated branch............ACROCARPI, p. 87
Sporophyte borne on a very short branch..PLEUROCARPI, p. 91

[ACROCARPI]

1. Capsule almost never opening by means of a lid.......... 2
   Capsule opening by means of a clearly defined lid........ 8
2. Green protonema persistent; plants fruiting in autumn.... **Ephemerum,** p. 116
   Green protonema not persistent; plants fruiting in spring 3
3. Spores few (16-20) and very large, sometimes 0.2 mm. in diameter ....**Archidium,** p. 95
   Spores numerous and small, rarely more than 0.05 mm. in diameter 4
4. Leaf margins plane or involute.......................... 5
   Leaf margins more or less revolute...................... 7
5. Capsule pyriform ....**Bruchia,** p. 95
   Capsule ovoid-globose 6
6. Leaves smooth ....**Pleuridium,** p. 96
   Leaves papillose; a rudimentary lid present but persistent **Astomum,** p. 106

7. Leaves smooth, eroso-denticulate at the apex........ **Acaulon**, p. 108
Leaves papillose, entire .... **Phascum**, p. 108

8. Peristome, when present, with articulate teeth.......... 9
Peristome teeth not articulate........................ 53

9. Peristome present 10
Peristome none 48

10. Leaves in 2 ranks, clasping at the base, and with a prominent dorsal wing 11
Leaves in 3 or more ranks, not clasping at the base or winged 12

11. Plants flaccid, aquatic, floating ....**Octodiceras**, p. 105
Plants not flaccid, sometimes submerged, but not floating **Fissidens**, p. 103

12. Leaves with a single layer of small chlorophyll cells enclosed by two or more layers of large hyaline cells **Leucobryum**, p. 102
Leaves mostly with a single layer of uniform cells........ 13

13. Peristome single, consisting of 16 or 32 teeth; teeth usually without a median longitudinal line on the outer surface 14
Peristome double, the outer more or less thickened and consisting of 16 teeth, the inner thin and divided into segments or cilia or both; teeth with a distinct median longitudinal line on the outer surface................. 33

14. Capsule with 8 longitudinal ridges of differentiated cells **Rhabdoweisia**, p. 99
Capsule smooth or, when plicate, the epidermis of uniform cell structure 15

15. Peristome teeth with very minute longitudinal striations on the outer surface................................ 16
Peristome teeth without longitudinal striations on the outer surface, smooth or papillose..................... 19

16. Alar cells large, hyaline or brown...................... 17
Alar cells not differentiated.......................... 18

17. Leaves tufted; capsule distinctly strumose; monoicous.. **Oncophorus**, p. 99
Leaves regularly secund; capsule not strumose or obscurely so; dioicous ....**Dicranum**, p. 100

18. Lamina of leaves strongly papillose.....**Dichodontium**, p. 99
Lamina of leaves smooth...................**Dicranella**, p. 98

19. Peristome distinctly twisted, teeth 32.................. 20
Peristome not twisted, teeth 16, often deeply cleft........ 22

20. Midrib with 2 median guides, upper band of stereid cells lacking .... **Tortula**, p. 109
Midrib with several (4-8) median guides and 2 bands of stereid cells 21

21. Leaf margins revolute, at least below the middle...... **Barbula**, p. 108
Leaf margins plane, not revolute.......... **Tortella**, p. 107

22. Calyptra mitrate 23
Calyptra cucullate 27

23. Calyptra plicate 24
Calyptra not plicate 25

24. Calyptra smooth; teeth distantly articulate.......... **Glyphomitrium**, p. 110
Calyptra hairy; teeth closely articulate... **Orthotrichum**, p. 113

25. Beak long, clavate .... **Encalypta ciliata**, p. 110
Beak apiculate to aciculate 26

26. Teeth narrowly cleft nearly to the base.. **Racomitrium**, p. 112
Teeth subentire, cribrose or irregularly cleft.. **Grimmia**, p. 111

27. Teeth of peristome arising from a distinct basal membrane 28
Teeth of peristome not arising from a basal membrane.... 31

28. Teeth short; leaves papillose on upper surface.......... **Didymodon**, p. 108
Teeth long; leaves mostly smooth.......... 29

29. Capsule inclined, distinctly plicate when dry; leaf cells roundish quadrate above .... **Ceratodon**, p. 97
Capsule erect, smooth or slightly plicate when dry; leaf cells more or less elongated above.......... 30

30. Leaves glaucous .... **Saelania**, p. 97
Leaves bright or dark green, glossy.......... **Ditrichum**, p. 96

31. Plants growing on trees.......... **Drummondia**, p. 113
Plants growing on earth or rocks.......... 32

32. Leaf margins strongly involute above, entire... **Weisia**, p. 106
Leaf margins plane, minutely crenulate.. **Trichostomum**, p. 107

33. Inner peristome without a basal membrane.......... 34
Inner peristome with a distinct carinate basal membrane.. 37

34. Calyptra cucullate .... **Funaria**, p. 117
Calyptra mitrate 35

35. Calyptra not plicate, smooth, entirely enclosing and extending below the base of the capsule.......... **Encalypta contorta**, p. 110
Calyptra plicate, usually hairy and partially enclosing the capsule 36

36. Leaves usually crispate when dry, base oval; stomata in neck of capsule, always superficial............**Ulota**, p. 115
Leaves not crispate when dry, base not oval; stomata in neck and upper part of capsule, mostly immersed...... **Orthotrichum**, p. 113

37. Capsule distinctly ribbed when dry........................ 38
Capsule smooth, not ribbed when dry.................... 41

38. Capsule ovoid-cylindrical ....**Aulacomnium**, p. 125
Capsule subglobose 39

39. Cilia well developed........................**Philonotis**, p. 127
Cilia none, or very rudimentary.......................... 40

40. Leaf cells smooth ....**Plagiopus**, p. 126
Leaf cells papillose ....**Bartramia**, p. 127

41. Leaves papillose on upper surface............**Timmia**, p. 127
Leaves smooth 42

42. Inner peristome 2-3 times as long as the outer, cilia rudimentary ....**Meesea**, p. 126
Inner peristome about as long as the outer, cilia well developed 43

43. Cilia appendiculate 44
Cilia smooth or nodose, not appendiculate............... 46

44. Leaf cells narrow, linear-rhomboidal above.............. **Leptobryum**, p. 117
Leaf cells rhomboidal-hexagonal, never linear........... 45

45. Plants stoloniferous; capsules clustered...**Rhodobryum**, p. 120
Plants not stoloniferous; capsules borne singly..**Bryum**, p. 119

46. Upper leaves ovate; cells broadly polygonal, never linear **Mnium**, p. 121
Upper leaves linear-lanceolate; cells narrowly polygonal to linear above 47

47. Leaves glaucous green; annulus none.....**Mniobryum**, p. 118
Leaves green to golden yellow, often glossy; annulus present ....**Pohlia**, p. 118

48. Plants growing on rocks or in crevices.................. 49
Plants growing on earth.................................. 51

49. Leaves without a midrib; stalk less than 1 mm. long; lid apiculate ....**Hedwigia**, p. 128
Leaves with a midrib; stalk 2-10 mm. long; lid rostrate.... 50

50. Usually growing on calcareous rocks; capsule smooth **Hymenostylium**, p. 106
Usually growing on non-calcareous rocks; capsule ribbed **Anœctangium**, p. 112

51. Leaf cells isodiametric above the middle; calyptra cucullate .... **Pottia**, p. 109
Leaf cells elongated above the middle; calyptra mitrate 52

52. Stalk almost lacking.................. **Aphanorrhegma**, p. 117
Stalk long (to 2 cm.).................. **Physcomitrium**, p. 117

53. Capsule symmetrical or nearly so......................... 54
Capsule strikingly unsymmetrical 57

54. Teeth of peristome 4......................... **Georgia**, p. 172
Teeth of peristome 32 or 64.............................. 55

55. Calyptra cucullate, nearly smooth.......... **Catharinæa**, p. 172
Calyptra mitrate, densely hairy.......................... 56

56. Capsule without stomata, cylindrical...... **Pogonatum**, p. 174
Capsule with stomata, prismatic or cylindrical.......... **Polytrichum**, p. 174

57. Capsule sessile; leaves green and conspicuous.. **Webera**, p. 171
Capsule raised on a thick, red stalk; leaves colorless and very minute .... **Buxbaumia**, p. 172

[PLEUROCARPI]

1. Leaves distichous .... **Fissidens**, p. 103
Leaves in 3 or more ranks............................. 2

2. Segments of inner peristome rudimentary or filiform, not split; cilia none 3
Segments of inner peristome distinctly carinate, often split along the keel 10

3. With a distinct, carinate basal membrane, segments very rudimentary; leaves papillose................. **Thelia**, p. 135
Without a basal membrane; leaves smooth or nearly so.. 4

4. Segments connected, at least in the apical region, by transverse bands 5
Segments entirely free, sometimes very rudimentary...... 6

5. Leaves with an excurrent midrib........... **Dichelyma**, p. 130
Leaves without a midrib................... **Fontinalis**, p. 128

6. Leaves complanate, transversely undulate..... **Neckera**, p. 131
Leaves spreading, not transversely undulate............. 7

7. Plants soft, often forming wide, velvety tufts; capsule strikingly contracted below the mouth when dry...... **Anacamptodon**, p. 134
Plants coarse, growing in lax, frequently pendent tufts; capsule not contracted below the mouth when dry...... 8

8. Leaves with a midrib.................................. 9
Leaves without a midrib................... **Leucodon**, p. 130

9. Branches terete; capsule immersed.........**Cryphæa,** p. 130
Branches flattened; capsule emergent on a short stalk.... **Forrstroemia,** p. 131

10. Leaves mostly rough-papillose......................... 11
Leaves smooth, rarely slightly papillose at the cell angles. 21

11. Capsule symmetrical, erect or nearly so................. 12
Capsule unsymmetrical, arcuate 16

12. Leaves with a midrib, margin usually entire............. 13
Leaves without a midrib 15

13. Midrib extending nearly to apex of leaf............... 14
Midrib vanishing at middle of leaf or below............. **Haplohymenium,** p. 136

14. Primary stem stoloniform; stem leaves minute.......... **Anomodon,** p. 137
Stem not stoloniform; stem and branch leaves uniform **Leskea,** p. 138

15. Plants glaucous green, branches julaceous; leaves closely imbricated; cilia two......................**Myurella,** p. 136
Plants light green, branches slightly flattened; leaves loosely appressed; cilia none....**Schwetschkeopsis,** p. 132

16. Monoicous 17
Dioicous 20

17. Stem and branch leaves differing in size and shape; leaf cells with several minute papillæ...................... 18
Stem and branch leaves similar in size and shape; leaf cells with one, rarely two papillæ, or smooth.......... 19

18. Lid short-rostrate; paraphyllia multiform......**Rauia,** p. 139
Lid long-rostrate; paraphyllia simple........**Thuidium,** p. 140

19. Leaf cells smooth or lightly papillate; plants of swampy woods or meadows.......................**Elodium,** p. 142
Leaf cells strongly papillate on both surfaces; plants of moist woods ....**Haplocladium,** p. 139

20. Stem and branch leaves similar in size and shape; paraphyllia mostly lacking.................**Claopodium,** p. 140
Stem and branch leaves differing in size and shape; paraphyllia numerous ....**Thuidium,** p. 140

21. Stem erect from a creeping caudex, dendroid; capsules clustered 22
Stem prostrate or ascending; capsules borne singly...... 23

22. Cilia lacking ....**Climacium,** p. 170
Cilia well developed, appendiculate.........**Thamnium,** p. 171

23. Capsule symmetrical, erect or nearly so; inner peristome without cilia 24
Capsule unsymmetrical, more or less inclined and curved; inner peristome arising from a broad basal membrane; cilia well developed 29

24. Branches strongly complanate; leaves cultriform .... **Homalia**, p. 132
Branches terete or somewhat flattened; leaves ovate to lanceolate 25

25. Segments either partially or wholly lining the teeth, basal membrane lacking or obscure 26
Segments entirely free from the teeth 27

26. Leaves with a midrib; stalk rough .... **Homalothecium**, p. 134
Leaves without a midrib; stalk smooth .... **Pylaisia**, p. 133

27. Basal membrane broad and distinct .... **Pylaisia subdenticulata**, p. 134
Basal membrane very narrow, or lacking 28

28. Stem oval in cross-section; capsule 3-4 mm. long .... **Entodon**, p. 132
Stem round in cross-section; capsule 1.5-2.5 mm. long; annulus several cells broad .... **Platygyrium**, p. 132

29. Midrib single 30
Midrib double or furcate, frequently short or lacking 42

30. Lid more or less long-rostrate 31
Lid conical to short-rostrate 33

31. Leaves spreading or imbricated 32
Leaves complanate .... **Rhynchostegium**, p. 150

32. Leaves very concave, spoon-shaped, abruptly filiform-acuminate .... **Cirriphyllum**, p. 147
Leaves plane or slightly concave, acute or gradually acuminate .... **Eurynchium**, p. 148

33. Leaves obtuse, apiculate, or acute 34
Leaves acuminate 36

34. Large mosses (6-20 cm.), growing in swamps; stem leaves 2-3.5 mm. long, spreading or imbricated ... **Calliergon**, p. 166
Medium-sized mosses (3-8 cm.), growing on rocks and earth in or along streams; leaves 0.6-1.6 mm. long, frequently secund 35

35. Midrib strong, disappearing abruptly just below apex of leaf .... **Amblystegium fluviatile**, p. 157
Midrib faint, vanishing near middle of leaf, frequently forked .... **Hygrohypnum**, p. 169

36. Leaves secund 37
Leaves equally spreading 39

37. Leaves strongly transversely undulate.....**Rhytidium**, p. 160
Leaves not transversely undulate........................ 38

38. Paraphyllia numerous ....**Cratoneuron**, p. 159
Paraphyllia lacking ....**Drepanocladus**, p. 167

39. Capsule oblong-ovoid; stem leaves much larger than branch leaves ....**Brachythecium**, p. 143
Capsule oblong-cylindrical; leaves mostly uniform in size 40

40. Stem densely tomentose, erect; leaves glossy............ **Camptothecium**, p. 142
Stem not densely tomentose; leaves rarely glossy......... 41

41. Stem prostrate and irregularly branched; rhizoids mostly numerous ....**Amblystegium**, p. 155
Stem prostrate or ascending; rhizoids few................ **Chrysohypnum**, p. 158

42. Leaves complanate 43
Leaves not complanate 44

43. Leaves decurrent; basal areolation lax, alar cells often more or less enlarged................**Plagiothecium**, p. 152
Leaves not at all or very slightly decurrent; basal cells scarcely differentiated ....**Isopterygium**, p. 151

44. Operculum long-rostrate ....**Sematophyllum**, p. 150
Operculum conical to short-rostrate..................... 45

45. Leaves obtuse or apiculate, rarely acute.................. 46
Leaves acuminate 48

46. Leaves usually more or less secund, gradually narrowed above to an obtuse or rarely acute apex; mosses growing on dripping or wet rocks.............**Hygrohypnum**, p. 169
Leaves imbricated or spreading, with a broad rounded apex 47

47. Mosses growing in swamps; stem with an outer layer of large hyaline cells ....**Acrocladium**, p. 167
Mosses growing in dry woods; stem bright red, cortical cells small ....**Hypnum**, p. 166

48. Leaves secund, falcate or circinate..................... 49
Leaves mostly spreading 51

49. A large moss (8-20 cm.), very regularly pinnate, frondiform; leaves multiplicate, smooth; paraphyllia numerous **Ptilium**, p. 162
Medium-sized mosses (1-10 cm.), irregularly pinnate; leaves scarcely or not at all plicate; paraphyllia few or none 50

50. Leaves sharply serrate, papillose...........**Ctenidium**, p. 161
Leaves entire or serrulate, smooth..........**Stereodon**, p. 162

51. Alar cells inflated............**Plagiothecium striatellum**, p. 154
 Alar cells not inflated, frequently quadrate, rectangular, or oblong 52

52. Annual growth regularly marked off......**Hylocomium**, p. 161
 Annual growth not clearly defined...................... 53

53. Leaves erect-spreading 54
 Leaves squarrose 55

54. Plants medium-sized, forming loose, spreading tufts; paraphyllia numerous and large...........**Heterophyllon**, p. 165
 Plants small, forming thin, depressed mats; paraphyllia lacking ....**Amblystegiella**, p. 154

55. Plants robust; stems 0.5-0.9 mm. in diameter; leaves 3-5 mm. long; capsules broadly ovoid........**Rhytidiadelphus**, p. 160
 Plants robust or slender; stems 0.1-0.4 mm. in diameter; leaves 1-3 mm. long; capsules cylindrical.............
 Chrysohypnum, p. 158

FAMILY ARCHIDIACEÆ

Archidium Brid.

Archidium ohioense Schimp.

On the ground in meadows and fields. Spring. New Haven: Orange (1881), *O. D. Allen.*

Throughout the eastern United States and westward to the Rocky Mountains.

FAMILY DICRANACEÆ

Bruchia Schwaegr.

Capsule ovoid, neck short........................**B. flexuosa**
Capsule elongated, neck long...................**B. Sullivantii**

Bruchia flexuosa (Schwaegr.) C. Müll.

Clayey ground in fields. Spring. Windham: Canterbury, *Mrs. Hadley.* New Haven: East Haven, *Nichols;* New Haven (1878), *J. A. Allen;* Woodbridge, *Eaton.*

New England to Minnesota, south to the Gulf States.

Ref. Eaton, 15, 72.

Bruchia Sullivantii Aust.

Clayey or sandy ground in fields. Spring. New Haven: New Haven (1890), *Evans.*

New England to Florida, west to Missouri and Louisiana.

Pleuridium Brid.

Leaves spreading, upper leaves long-subulate. . **P. alternifolium**
Leaves of sterile shoots closely appressed, upper leaves of fertile shoots abruptly short-pointed. . . . . **P. Sullivantii**

Pleuridium alternifolium (Dicks.) Rabenh.

Moist clayey or sandy soil in fields and ditches. Spring. New Haven: East Haven, *J. A. Allen;* Hamden and New Haven (1874), *Eaton.*

New England to Wisconsin, south to the mountains of Alabama; Europe; Asia.

Exsic. Holzinger, Musci Acro. Bor.-Amer. No. 227.

Ref. Eaton, **15**, 61.

Pleuridium Sullivantii Aust.

Light, sandy soil in fields. Spring. New Haven: Orange (1880), *O. D. Allen.*

Connecticut to South Carolina.

Ditrichum Timm

1. Monoicous; stalk yellow; fruiting in June. . . . . **D. pallidum**
   Dioicous; stalk red; fruiting in autumn. 2
2. Stem leaves imbricated; perichætial leaves long-sheathing **D. vaginans**
   Stem leaves spreading; perichætial leaves scarcely sheathing . . . . **D. tortile**

Ditrichum vaginans (Sull.) Hampe. *Leptotrichum vaginans* Schimp.

Moist, sandy or loamy ground in hilly regions. Autumn. Litchfield: Salisbury, *Nichols.* Windham: Canterbury, *Mrs. Hadley.* Fairfield: Danbury, *Nichols.* New Haven: Hamden, *O. D. Allen;* New Haven (1855), *Eaton.*

New Brunswick to North Carolina, west to Missouri; Europe.

Ref. Eaton, **15**, 62.

Ditrichum tortile (Schrad.) Lindb. *Leptotrichum tortile* C. Müll.

Clayey soil along roadsides and in fields. Autumn. Hartford: Glastonbury, *Miss Lorenz.* Tolland: Bolton and

Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Darien, *Mrs. Lowe;* Huntington, *Nichols.* NEW HAVEN: Hamden, *Evans;* Meriden, *Nichols;* New Haven (1855), *Eaton;* Orange, *Nichols.* MIDDLESEX: Chester, *Nichols.* NEW LONDON: Waterford, *C. B. Graves.*

Newfoundland and Labrador to Minnesota, south to the Gulf States; Europe; Asia; Africa.

REF. Eaton, 15, 62.

Ditrichum pallidum (Schreb.) Hampe. *Leptotrichum pallidum* Hampe.

Bare earth in the woods. June. LITCHFIELD: Salisbury, *Nichols.* HARTFORD: Southington, *Chamberlain.* TOLLAND: Andover, *Weatherby;* Bolton, *Miss Lorenz.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Darien, *Mrs. Lowe;* Sherman and Stratford, *Nichols.* NEW HAVEN: Beacon Falls, *Nichols;* East Haven, *Evans;* Hamden (1867), New Haven, and North Haven, *Eaton;* Orange, *Nichols;* Woodbridge, *J. A. Allen.* NEW LONDON: Ledyard and North Stonington, *C. B. Graves.*

Ontario to the Gulf of Mexico, west to Kansas; Europe; Asia; Africa.

REF. Eaton, 15, 62.

Saelania Lindb.

Saelania glaucescens (Hedw.) Broth. *S. cæsia* (Vill.) Lindb.

Earth and crevices of rocks, especially limestone, in mountainous or hilly regions. Summer. LITCHFIELD: Salisbury, *Evans.* FAIRFIELD: Monroe, *Miss Lorenz;* Sherman, *Nichols.* NEW HAVEN: New Haven (1878), *J. A. Allen;* Oxford, *Miss Lorenz.*

Greenland and Labrador to the Middle Atlantic States, west to British Columbia and Colorado; Europe; Asia; New Zealand.

Ceratodon Brid.

Ceratodon purpureus (L.) Brid.

Burnt-over woods, roadsides, waste ground, and roofs. May-June. LITCHFIELD: New Milford, *Nichols;* Salisbury, *Mrs. Phelps.* HARTFORD: Bloomfield and Hartford, *Miss Lorenz.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Bridgeport, *Eames;* Darien, *Mrs. Lowe;* Fairfield, *Eames;* Huntington, *Nichols.* NEW HAVEN: Cheshire and Madison, *Nichols;* New Haven (1855), *Eaton;* North Haven, *J. A. Allen;* Orange, *Evans;* Oxford, *Harger.* MIDDLESEX: Killingworth, *Nichols.* NEW LONDON: Ledyard, *Nichols;* Waterford, *C. B. Graves.*

Throughout North America; a cosmopolitan.

REF. Eaton, 15, 62. Mrs. Lowe, **54** (incorrectly determined as *C. minor* Aust.).

Dicranella Schimp.

1. Capsule plicate when dry; epidermis composed of narrow cells; stalk yellowish........................**D. heteromalla**
   Capsule always smooth; epidermis composed of quadrate cells; stalk reddish 2
2. Capsule cernuous ....**D. varia**
   Capsule erect ....**D. rufescens**

Dicranella heteromalla (L.) Schimp. *Dicranum heteromallum* Hedw.

Clayey, non-calcareous soil in open woods. Autumn. LITCHFIELD: Salisbury, *Gilman.* HARTFORD: Southington, *Chamberlain.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley;* Windham, *Nichols.* FAIRFIELD: Darien, *Mrs. Lowe;* Huntington, *Nichols.* NEW HAVEN: East Haven (1877) and Hamden, *J. A. Allen;* Madison, *Nichols;* New Haven, *O. D. Allen;* Orange, *J. A. Allen;* Woodbridge, *Eaton.* MIDDLESEX: Killingworth, *Nichols.* NEW LONDON: East Lyme and New London, *C. B. Graves.*

Newfoundland to Louisiana, westward to the Pacific; Europe; Asia.

REF. Eaton, 15, 61.

Dicranella rufescens (Dicks.) Schimp.

Wet clayey soil. Autumn. HARTFORD: Wethersfield, *Mrs. Lowe.* FAIRFIELD: Darien, *Mrs. Lowe.* NEW HAVEN: New Haven (1879), *J. A. Allen;* Woodbridge, *Eaton.*

Nova Scotia to West Virginia, west to Alaska and Washington; Europe; Asia.

REF. Mrs. Lowe, 57.

Dicranella varia (Hedw.) Schimp. *Dicranum varium* Hedw.

Clay banks and moist earth. Autumn. NEW HAVEN: East Haven, *O. D. Allen;* New Haven (1875), *J. A. Allen;* Orange, *Young;* Oxford, *Harger;* Woodbridge, *J. A. Allen.*

Nova Scotia to Georgia, westward to the Pacific; Alaska; Europe; Asia; Africa.

REF. Eaton, 15, 61.

Rhabdoweisia Br. & Sch.

Rhabdoweisia denticulata (Brid.) Br. & Sch.

Moist shaded cliffs, steep rocks and banks, but not on limestone, in mountainous or hilly regions. Summer. LITCHFIELD: New Milford, *Nichols;* Salisbury, *Gilman.* TOLLAND: Stafford and Vernon, *Nichols.* FAIRFIELD: Redding, *Evans;* Sherman, *Nichols.* NEW HAVEN: Beacon Falls, *Nichols;* Naugatuck, *Evans;* New Haven, *O. D. Allen;* Woodbridge (1878), *J. A. Allen.*

Newfoundland to Wisconsin and North Carolina; Europe.

Dichodontium Schimp.

Dichodontium pellucidum (L.) Schimp.

Banks of streams and wet rocks in the woods. Autumn. NEW HAVEN: Hamden (1881), *J. A. Allen.*

Arctic America, Canada, and the northern United States; Europe; Asia.

Oncophorus Brid.

Oncophorus virens (Sw.) Brid. *Cynodontium virens* Schimp.

Moist non-calcareous earth and rocks or damp wood in mountainous or hilly woods. Spring. TOLLAND: Stafford (1906), *Nichols.*

Canada and the northern United States; Europe; Asia.

Dicranum Hedw.

1. Capsule cernuous, arcuate 2
   Capsule erect, symmetrical 5

2. Leaves not undulate, midrib percurrent..........**D. scoparium**
   Leaves transversely undulate, midrib not reaching apex.... 3

3. Upper leaf cells elongated; capsules clustered...**D. undulatum**
   Upper leaf cells isodiametric; capsules borne singly....... 4

4. Upper part of leaves strongly papillose at back....**D. spurium**
   Leaves smooth at back..........................**D. Bergeri**

5. Lamina of leaves more or less bistratose in upper part.... **D. fulvum**
   Lamina unistratose throughout 6

6. Midrib without median guides and excurrent; leaves suddenly narrowed into a long setaceous point..**D. longifolium**
   Midrib with median guides and vanishing below apex of leaf; leaves lanceolate-subulate 7

7. Cells in upper part of leaves rectangular, papillose at back; plants not producing flagelliform branchlets..**D. montanum**
   Cells in upper part of leaf less regular, smooth at back; plants frequently characterized by numerous flagelliform branchlets ....**D. flagellare**

Dicranum spurium Hedw.

Shaded sandy soil and rocks, never on limestone. June. LITCHFIELD: Salisbury, *Nichols*. NEW HAVEN: New Haven (1881), *J. A. Allen*. NEW LONDON: Ledyard, *Setchell*.*

Newfoundland to Wisconsin, south to Florida; Europe; Asia.

EXSIC. Holzinger, Musci Acro. Bor.-Amer. No. 228^{b}.

Dicranum undulatum Ehrh.

Moist soil and earth-covered rocks in hilly woods. Summer. LITCHFIELD: New Milford, *Nichols;* Salisbury, *Miss Lorenz*. HARTFORD: West Hartford, *Miss Lorenz*. NEW HAVEN: East Haven (1855), *Eaton;* Meriden, *Nichols;* Woodbridge, *J. A. Allen*. MIDDLESEX: Killingworth, *Nichols*.

Canada and the northern United States; Europe; Asia.

REF. Eaton, 15, 61.

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* Reported by Barron from "near the Sound" (Eaton, 15, 61).

Dicranum Bergeri Bland. *D. Schraderi* Web. f. & Mohr.

Peat bogs and wet woods. Summer. LITCHFIELD: New Milford, *Evans.* HARTFORD: West Hartford, *Miss Lorenz.* TOLLAND: Stafford, *Weatherby;* Vernon, *Miss Lorenz.* NEW HAVEN: New Haven, *J. A. Allen;* Wallingford (1878), *Barron.* MIDDLESEX: Killingworth, *Nichols.* NEW LONDON: Waterford, *C. B. Graves.*

Arctic America, Canada, and the northern United States; Europe; Asia.

REF. Eaton, 15, 61 (misprinted *D. Schreberi*). Miss Lorenz, 52 (incorrectly determined as *D. Muhlenbeckii*).

Dicranum scoparium (L.) Hedw.

On all sorts of substrata in moist or dry woods. Aug.-Sept. LITCHFIELD: Cornwall, *Greene;* Salisbury, *Gilman.* HARTFORD: Plainville, *Chamberlain;* West Hartford, *Miss Lorenz.* TOLLAND: Ellington and Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Danbury, *Nichols;* Darien, *Mrs. Lowe;* Fairfield and Trumbull, *Eames.* NEW HAVEN: Beacon Falls, *Nichols;* East Haven, *Evans;* Hamden, *Eaton;* Meriden, *Miss Lorenz;* New Haven (1855), *Eaton;* Orange, *Evans;* Oxford, *Harger.* MIDDLESEX: Killingworth, *Nichols;* Middlefield, *Evans.* NEW LONDON: North Stonington and Waterford, *C. B. Graves.*

Throughout Canada and the United States; Europe; Asia.

REF. Eaton, 15, 61.

Dicranum fulvum Hook. *D. interruptum Brid.*

Trees and decayed logs in pine or hemlock woods in mountainous or hilly regions. Summer. NEW HAVEN: East Haven, *Hatcher;* Woodbridge (1879), *O. D. Allen.*

Newfoundland to Manitoba, south to West Virginia; Europe; Asia.

Dicranum flagellare Hedw.

On stumps and logs, and at the base of trees, in moist woods. Summer. LITCHFIELD: Norfolk, *Miss Lorenz;* Salisbury, *Gilman.* HARTFORD: West Hartford, *Miss Lorenz.* TOLLAND: Ellington, *Pease;* Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Darien, *Mrs. Lowe;* Stratford, *Nichols.* NEW HAVEN: Hamden, *Nichols;* New Haven (1856), *Eaton;* Orange, *Pease;* Oxford, *Harger.* MIDDLESEX: Killingworth, *Nichols.* NEW LONDON: New London and Waterford, *C. B. Graves.*

Nova Scotia to North Cárolina, and westward to British Columbia; Mexico; Europe; Asia.

REF. Eaton, 15, 61.

Dicranum fulvum Hook. *D. interruptum* Brid.

Non-calcareous rocks in moist hilly woods. Aug.-Oct. LITCHFIELD: Salisbury, *Nichols.* HARTFORD: Burlington, *Nichols;* Hartford, *Miss Lorenz.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Darien, *Mrs. Lowe.* NEW HAVEN: Branford, *Chatterton;* Hamden, *Pease;* New Haven (1856), *Eaton;* Orange, *Evans;* Woodbridge, *Eaton.* MIDDLESEX: Killingworth, *Nichols.* NEW LONDON: East Lyme, New London, and Waterford, *C. B. Graves.*

Nova Scotia to Wisconsin, south to North Carolina and Missouri; Europe.

EXSIC. Holzinger, Musci Acro. Bor.-Amer. No. 104.

REF. Eaton, 15, 61.

Dicranum longifolium Ehrh.

On rocks and tree trunks in mountainous or hilly regions; not on pure limestone. Late summer. NEW HAVEN: Meriden (1856), *Eaton;* Oxford, *Harger.*

Nova Scotia to North Carolina, west to British Columbia and Colorado; Greenland; Europe; Asia.

REF. Eaton, 15, 61.*

FAMILY LEUCOBRYACEÆ

Leucobryum Hampe

Leucobryum glaucum (L.) Schimp. *L. vulgare* Hampe.

On moist soil or rocks in the woods. Fruit occasional, autumn. Litchfield: New Milford, *Nichols;* Salisbury, *Mrs. Phelps.* Hartford: West Hartford, *Miss Lorenz.* Tolland: Stafford, *Nichols.* Windham: Canterbury, *Mrs. Hadley.* Fairfield: Darien, *Mrs. Lowe;* Trumbull, *Eames.* New Haven: Beacon Falls, *Nichols;* East Haven, Hamden (1866), and New Haven, *Eaton;* North Haven, *Harger;* Orange, *Eaton;* Oxford, *Harger;* Woodbridge, *Nichols.* Middlesex: Killingworth, *Nichols.* New London: East Lyme and North Stonington, *C. B. Graves.*

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* Two other species of Dicranum, **D. fuscescens** Turn. and **D. viride** (Sull. & Lesq.) Lindb. (as *Campylopus viridis* Sull. & Lesq.), are reported by Eaton (15, 61) on the authority of Barron, but no Connecticut specimens examined by the writers have been referable to either of these species.

Newfoundland to the Rocky Mountains, south to Florida and Louisiana; Europe; Asia; Africa.

Ref. Eaton, 15, 61.

FAMILY FISSIDENTACEÆ

Fissidens Hedw.

1.	Fruit borne on the stem or on a leading branch	2
	Fruit borne on a short branch	5
2.	Leaves without a border	3
	Leaves bordered by a narrow band of pale, elongated cells	4
3.	Leaves obtuse, margin entire	**F. obtusifolius**
	Leaves apiculate, margin crenulate	**F. osmundoides**
4.	Border thick, usually confluent at apex of leaf with the midrib	**F. bryoides**
	Border narrow, almost wanting at apex of leaf; midrib percurrent	**F. incurvus**
5.	Leaves without a border	6
	Leaves bordered by several rows of paler, often thick-walled cells	7
6.	Midrib percurrent	**F. taxifolius**
	Midrib vanishing below the apex	**F. subbasilaris**
7.	Leaf cells obscure (0.007-0.009 × 0.01-0.012 mm.)	**F. cristatus**
	Leaf cells distinct (0.01-0.014 × 0.014-0.018 mm.)	**F. adiantoides**

Fissidens bryoides (L.) Hedw.

On shaded earth in greenhouses, etc. Autumn. New Haven: New Haven (1876), *Veitch.*

Throughout temperate North America, and north to Yukon Territory; Europe; Asia; Africa; New Zealand.

REF. Eaton, 15, 62.*

Fissidens incurvus Schwaegr. Including *F. minutulus* Sull.

On wet shaded stones, usually in brooks. Autumn. LITCHFIELD: Salisbury, *Mrs. Phelps.* TOLLAND: Bolton and Stafford, *Nichols.* FAIRFIELD: Danbury, *Nichols.* NEW HAVEN: Bethany, *Evans*; Cheshire, *Harger;* East Haven (1874), *Kleeberger;* Hamden, *J. A. Allen;* Orange, *Nichols;* Oxford, *Harger.* MIDDLESEX: Middlefield, *Evans.*

Canada and the northern United States; Cuba; Europe; Asia; Africa; New Zealand; Tasmania.

REF. Eaton, 15, 62.

Fissidens obtusifolius Wils.

Wet rocks and stones. Aug.-Sept. LITCHFIELD: Salisbury (1907), *Nichols.*

New England to Minnesota and Colorado, south to Alabama and Texas.

Fissidens adiantoides (L.) Hedw.

On shaded rocks and earth in wet places. Oct.-Dec. LITCHFIELD: New Milford and Salisbury, *Nichols.* HARTFORD: Hartford, *Miss Lorenz.* TOLLAND: Bolton, *Nichols.* FAIRFIELD: Danbury, *Nichols.* NEW HAVEN: Cheshire, *J. A. Allen;* East Haven (1856), *Eaton;* Madison, *Adams;* Milford, *Harger;* Orange, *Evans;* Woodbridge, *Eaton.* MIDDLESEX: Killingworth, *Nichols;* Middlefield, *Evans.* NEW LONDON: Groton, *C. B. Graves.*

Newfoundland to Alaska, south to Florida and Washington; Europe; Asia; Africa; New Zealand; Tasmania.

REF. Eaton, 15, 62.

Fissidens cristatus Wils. *F. decipiens* DeNot.

On moist, preferably calcareous, rocks in hilly regions.

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* "In a greenhouse, *R. Veitch;* also on the sides of a well on Church Street, New Haven, *W. T. Browne.*" Both of these stations have since probably been destroyed.

Oct.-Dec. LITCHFIELD: Salisbury, *Nichols.* HARTFORD: Hartford, *Miss Lorenz.* FAIRFIELD: Danbury (1884), *Eaton;* Sherman, *Evans.* NEW HAVEN: Orange, *Evans.*

Nova Scotia to the Rocky Mountains, and south to the Gulf States; Europe; Asia.

Fissidens taxifolius (L.) Hedw.

Moist earth and clay banks in the woods. Fruit rare, winter. LITCHFIELD: Salisbury, *Nichols.* TOLLAND: Ellington, *Nichols.* FAIRFIELD: Danbury, *Nichols.* NEW HAVEN: East Haven (1874), *Kleeberger;* Hamden, *Eaton;* Madison, *Nichols;* New Haven, *Eaton;* North Haven, *Nichols;* Woodbridge, *Eaton.*

Throughout the eastern United States; Europe; Asia; Africa.

REF. Eaton, 15, 62 (incorrectly reported as *F. osmundoides*).

Fissidens osmundoides (Sw.) Hedw.

Swampy woods and borders of streams. Summer. LITCHFIELD: Salisbury, *Nichols.* TOLLAND: Stafford, *Nichols.* NEW HAVEN: Branford, *J. A. Allen;* Orange, *Evans;* Woodbridge (1866), *Eaton.*

Arctic America, Canada, and the northern United States; Europe; Asia.

Fissidens subbasilaris Hedw.

On earth and at the base of trees in the woods. Autumn. NEW HAVEN: Hamden (1878), *Eaton.*

Ontario and the eastern United States.

Octodiceras Brid.

Octodiceras Julianum (Savi) Brid. *Conomitrium Julianum* Mont.

Attached to stones and wood in springs and brooks. Spring. FAIRFIELD: Danbury, *Nichols.* NEW HAVEN: Hamden (1876), *J. A. Allen;* Meriden, *Eaton*; New Haven, *Nichols;* Woodbridge, *Eaton.*

Ontario to Montana, south to Mexico; Cuba; South America; Europe; Africa.

EXSIC. Renauld & Cardot, Musci Amer. Sept. No. 16^b (as *Conomitrium Julianum*).

REF. Mrs. E. G. Britton, 9, 83. Eaton, 15, 62; 16, 244.

FAMILY POTTIACEÆ

Astomum Hampe

Astomum Sullivantii Schimp. *Systegium Sullivantii* Schimp.

Moist grassy places. Spring. NEW HAVEN: East Haven, *J. A. Allen;* Oxford, *Harger;* Woodbridge (1878), *Eaton.*

Probably throughout temperate North America.

REF. Eaton, 15, 72.

Weisia Hedw.

Weisia viridula (L.) Hedw.

Roadsides, banks, and fields, on bare earth. Spring. LITCHFIELD: New Milford, *Nichols.* HARTFORD: Canton, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Darien, *Mrs. Lowe;* Sherman, *Nichols;* Trumbull, *Eames.* NEW HAVEN: East Haven, Hamden, and Meriden, *Nichols;* New Haven (1854) and North Haven, *Eaton;* Orange, *J. A. Allen;* Woodbridge, *Eaton.* MIDDLESEX: Killingworth, *Nichols.* NEW LONDON: Waterford, *C. B. Graves.*

Throughout Canada and the United States; Europe; Asia; Africa; New Zealand; Tasmania.

REF. Eaton, 15, 62.

Hymenostylium Brid.

Hymenostylium curvirostre (Ehrh.) Lindb. *Gymnostomum curvirostre* Hedw.

Moist rocks, usually calcareous, in mountainous or hilly regions. Summer. LITCHFIELD: Salisbury, *Evans.* HARTFORD: Windsor, *Miss Lorenz.* TOLLAND: Bolton, *Nichols.* NEW HAVEN: Hamden, *Hall.* MIDDLESEX: Killingworth, (1875) *Hall.*

Labrador to Alaska, south to California and South Carolina; Europe; Asia; Africa.

REF. Eaton, 15, 61.

Trichostomum Hedw.

Trichostomum cylindricum (Bruch) C. Müll. *Didymodon cylindricus* Br. & Sch.

Wet non-calcareous stones in or beside brooks in mountainous or hilly regions. Fruit very rare, autumn. New Haven: Hamden (1879), *J. A. Allen;* Orange, *O. D. Allen.*

Greenland to North Carolina, west to Manitoba; South America; Europe; Asia.

Tortella (C. Müll.) Limpr.

Monoicous; plants less than 1 cm. high, loosely cæspitose; leaves linear, abruptly mucronate...............**T. cæspitosa**
Dioicous; plants 2-6 cm. high, in pulvinate tufts; leaves lanceolate, long-acuminate or cuspidate.........**T. tortuosa**

Tortella tortuosa (L.) Limpr. *Barbula tortuosa* Web. f. & Mohr.

Rocks, usually calcareous, in mountainous or hilly regions. Fruit rare, June. Hartford: West Hartford, *Miss Lorenz.* New Haven: Cheshire, *Harger;* Meriden, *Price;* Orange (1856), *Eaton;* New Haven, *O. D. Allen.*

Greenland, Canada, and the northern United States; Europe; Asia; Africa.

Ref. Eaton, 15, 62.

Tortella cæspitosa (Schwaegr.) Limpr. *Barbula cæspitosa* Schwaegr.

Earth and roots of trees in the woods. June. Litchfield: Salisbury, *Gilman.* Windham: Canterbury, *Mrs. Hadley.* Fairfield: Darien, *Mrs. Lowe.* New Haven: East Haven, *Evans;* New Haven (1856), *Eaton;* Orange, *Nichols;* Oxford, *Harger;* Woodbridge, *J. A. Allen.* New London: North Stonington and Waterford, *C. B. Graves.*

Ontario and New England to the Gulf States, west to British Columbia; Mexico; South America; Europe; Asia; Africa.

Ref. Eaton, 15, 62. Mrs. Lowe, 57.

Didymodon Hedw.

Didymodon rubellus (Hoffm.) Br. & Sch.

Wet, usually calcareous rocks, in mountainous or hilly regions. Summer. LITCHFIELD: Salisbury, *Nichols.* TOLLAND: Bolton, *Nichols.* NEW HAVEN: Woodbridge (1879), *J. A. Allen.*

Alaska, Canada, and the northern United States; Europe; Asia; Africa; Tasmania.

Barbula Hedw.

Leaves gradually acuminate, midrib percurrent......**B. fallax**
Leaves obtuse and mucronate, midrib excurrent..**B. unguiculata**

Barbula fallax Hedw.

Moist earth, walls, and rocks, in limestone districts. Nov.-Jan. LITCHFIELD: Salisbury (1905), *Nichols.*

Canada and the northern United States, north to the arctic regions; Europe; Asia; Africa.

Barbula unguiculata (Huds.) Hedw.

On all sorts of earth formations. Winter. LITCHFIELD: New Milford, *Nichols.* NEW HAVEN: East Haven and New Haven (1855), *Eaton;* Orange and Oxford, *Harger;* Wallingford, *Evans;* Woodbridge, *J. A. Allen.*

Probably throughout the northern United States and Canada; Europe; Asia; Africa.

REF. Eaton, 15, 62.

Acaulon C. Müll.

Acaulon muticum (Schreb.) C. Müll. *Sphærangium muticum* Schimp.

Clay or earth in fields. Spring. NEW HAVEN: Hamden (1878), *J. A. Allen;* New Haven, *Eaton;* Orange, *J. A. Allen.*

Probably throughout temperate North America; Europe; Africa.

REF. Eaton, 15, 61.

Phascum L.

Phascum cuspidatum Schreb.

On earth in fields and grassy places. Spring. NEW

HAVEN: East Haven and New Haven, *Eaton;* Woodbridge (1878), *J. A. Allen.*

Ontario to South Carolina, westward to the Pacific States; South America; Europe; Asia; Africa.

REF. Eaton, 15, 61.

Pottia Ehrh.

Pottia truncatula (L.) Lindb. *P. truncata* Fürn.

In moist places,— meadows, banks of streams, etc. Autumn to spring. NEW HAVEN: Woodbridge (1878), *J. A. Allen.*

Quebec and New England to Pennsylvania; Nevada; Europe; Asia; Africa.

Tortula Hedw.

1. Growing on trunks of trees; midrib bearing gemmæ in upper half; not yet found fruiting in this country...... **T. papillosa**

   Growing on rocks; midrib not gemmiparous; frequently fruiting 2

2. Dioicous; tufts large, 2-5 cm. high; midrib excurrent into a long smooth hair-point........................**T. montana**

   Monoicous; tufts small, 5-15 mm. high; midrib excurrent into a long toothed hair-point....................**T. muralis**

Tortula muralis (L.) Hedw. *Barbula muralis* Timm.

Walls and sunny rocks. Spring. NEW LONDON: New London (1895), *C. B. Graves.*

Throughout North America; a cosmopolitan.

Tortula papillosa Wils. *Barbula papillosa* C. Müll.

Trunks of trees, rarely rocks in the open. LITCHFIELD: Salisbury, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Danbury, *Nichols.* NEW HAVEN: East Haven and Hamden, *Nichols;* Milford, *Harger;* New Haven (1855), *Eaton;* Orange, *J. A. Allen.*

Throughout the northern Atlantic States; South America; Europe; Australia; New Zealand; Tasmania.

EXSIC. Holzinger, Musci Acro. Bor.-Amer. No. 235.

REF. Eaton, 15, 62.

Tortula montana (Nees) Lindb.

Sunny rocks, usually calcareous, in mountainous or hilly regions. New Haven: East Haven (1880) and Orange, *J. A. Allen.*

Northern North America; Europe; Asia; Africa.

Encalypta Schreb.

Gemmæ wanting; monoicous; capsule smooth, peristome single .... **E. ciliata**

Gemmæ brown, slender, borne in clusters in the axils of the leaves; dioicous; capsule spirally striate, peristome double .... **E. contorta**

Encalypta ciliata (Hedw.) Hoffm.

Shaded earth or rocks in mountainous or hilly regions. Summer. New Haven: Branford (1881), *J. A. Allen.*

Arctic America, Canada and the northern United States; Europe; Asia; Africa; Australia; Hawaiian Islands.

Encalypta contorta (Wulf.) Lindb. *E. streptocarpa* Hedw.

Earth and rocks, often calcareous, in mountainous or hilly regions. Not yet found fruiting in America. Litchfield: New Milford, *Nichols;* Salisbury, *Gilman.* Hartford: West Hartford, *Miss Lorenz.* Tolland: Bolton, *Miss Lorenz.* New Haven: Branford, *J. A. Allen;* Orange (1855), *Eaton;* Woodbridge, *J. A. Allen.*

Ontario to Virginia, and westward to the Rocky Mountains; Europe; Asia.

Ref. Eaton, 15, 63.

FAMILY GRIMMIACEÆ

Glyphomitrium Brid.

Glyphomitrium incurvum (Schwaegr.) Broth. *Ptychomitrium incurvum* Sull.

Exposed non-calcareous rocks. Spring. Hartford: Granby, *Nichols.* Windham: Canterbury, *Mrs. Hadley.* New Haven: Cheshire, *Nichols;* Hamden and New Haven (1866), *Eaton;* Oxford, *Harger;* Woodbridge, *Evans.*

Ontario and New England to Georgia, westward to Kansas and Texas.

Ref. Eaton, 15, 62.

Grimmia Ehrh.

1. Capsule shorter than stalk, emergent or exserted....**G. Olneyi**
   Capsule longer than stalk, immersed...................... 2
2. Walls of lower leaf cells sinuate....................**G. pilifera**
   Walls of lower leaf cells not sinuate..................... 3
3. Plants in small dense cushions, soft, lurid green; leaf cells rounded-quadrate, 0.009-0.01 mm. above..........**G. conferta**
   Plants in laxer cushions, more robust, coarse, brownish; leaf cells rounded, 0.006-0.007 mm. above........**G. apocarpa**

Grimmia apocarpa (L.) Hedw.

On rocks and stones of various kinds. Late spring. Litchfield: Salisbury, *Gilman;* Torrington, *Mrs. Lowe.* Hartford: Bristol and Canton, *Nichols.* Tolland: Stafford, *Nichols.* Windham: Canterbury, *Mrs. Hadley.* New Haven: Cheshire, *Nichols;* Hamden, *J. A. Allen;* New Haven (1855) and Orange, *Eaton;* Oxford, *Harger;* Woodbridge, *J. A. Allen.* Middlesex: Killingworth, *Nichols.* New London: New London, *C. B. Graves.*

Alaska, Canada, and the northern United States; found in most quarters of the globe.

Ref. Eaton, 15, 62.

Grimmia conferta Funck.

Steep sunny rocks. Spring. Litchfield: Salisbury, *Nichols.* Tolland: Ellington, *Nichols.* Fairfield: Sherman, *Nichols.* New Haven: Hamden (1877), *O. D. Allen;* Woodbridge, *Eaton.*

Nova Scotia to the Middle Atlantic States, and westward to the Pacific; Europe; Asia; Africa.

Exsic. Renauld & Cardot, Musci Amer. Sept. No. 168.

Ref. Eaton, 15, 62.

Grimmia pilifera Beauv. *G. pennsylvanica* Schwaegr.

Moist rocks in hilly woods. May-June. Litchfield: New Milford and Salisbury, *Nichols.* Hartford: Simsbury, *Miss Lorenz.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Stratford, *Eames.* NEW HAVEN: East Haven, *Evans;* Hamden, *J. A. Allen;* New Haven (1854), *Eaton;* Oxford and Woodbridge, *Harger.*

Nova Scotia to Minnesota, south to Georgia; Mexico; Japan.

REF. Eaton, 15, 62.

Grimmia Olneyi Sull.

Sloping rocks and bowlders, never on limestone. Spring. NEW HAVEN: Branford and Madison, *Eaton;* Meriden, *Nichols;* New Haven (1855), *Eaton;* Oxford, *Harger.* MIDDLESEX; Killingworth, *Nichols.* NEW LONDON: Ledyard, *Nichols.*

Ontario and New England to Georgia.

EXSIC. Renauld & Cardot, Musci Amer. Sept. No. 169.

REF. Eaton, 15, 62. Sullivant, 70, 67.

Racomitrium Brid.

Racomitrium aciculare (L.) Brid.

Shaded non-calcareous rocks along mountain or hill streams. Fruit rare, spring. LITCHFIELD: Salisbury, *Gilman.* NEW HAVEN: Hamden (1878), *Eaton;* Oxford, *Harger.* NEW LONDON: Montville, *C. B. Graves.*

Alaska, Canada, and southward to California and Alabama; Europe; Africa.

REF. Eaton, 15, 62.

FAMILY ORTHOTRICHACEÆ

Anœctangium Hedw.

Anœctangium Mougeotii (Br. & Sch.) Lindb. *Amphoridium Mougeotii* Schimp.

Crevices of damp, shaded rocks in mountainous or hilly regions. Fruit very rare, July-Aug. NEW HAVEN: Branford and Hamden, *Eaton;* Meriden, *Price;* Woodbridge (1878), *O. D. Allen.*

Newfoundland to Alabama, westward to Alaska and Oregon; Europe; Asia.

EXSIC. Renauld & Cardot, Musci Amer. Sept. No. 174.

Drummondia Hook.

Drummondia clavellata Hook.

Trunks of trees in the woods. Summer. Litchfield: Salisbury, *Nichols.* Hartford: Bloomfield, *Miss Lorenz;* Canton, *Nichols;* Hartford, *Miss Lorenz;* Southington, *Chamberlain.* Windham: Canterbury, *Mrs. Hadley.* Fairfield: Danbury, *Nichols.* New Haven: Bethany and Hamden, *Eaton;* Meriden, *Nichols;* New Haven (1855), *Eaton;* North Branford, *Harger.* Middlesex: Killingworth, *Nichols.* New London: North Stonington and Waterford, *C. B. Graves.*

Ontario and New England, south to Alabama and Missouri; Asia.

Ref. Eaton, 15, 62.

Orthotrichum Hedw.

1. Capsule with superficial stomata; plants growing on trees ..... **O. sordidum**
   Capsule with immersed stomata 2
2. Peristome single, capsule plicate when dry; plants growing on rocks 3
   Peristome double; plants growing on trees 4
3. Capsule long-exserted ..... **O. anomalum**
   Capsule immersed or emergent ..... **O. Lescurii**
4. Capsule smooth when dry ..... **O. pusillum**
   Capsule plicate when dry 5
5. Calyptra hairy 6
   Calyptra smooth ..... **O. pumilum**
6. Capsule strongly plicate, reddish brown, contracted under the mouth when dry; leaves acute ..... **O. Braunii**
   Capsule not strongly plicate, pale yellowish, very slightly or not at all contracted below the mouth when dry; leaves obtuse ..... **O. ohioense**

Orthotrichum sordidum Sull. & Lesq.

On trees in wet woods. Spring. Hartford: Hartford, *Mrs. Lowe.* Tolland: Ellington, *Pease.* Windham: Canterbury, *Mrs. Hadley.* New Haven: New Haven (1876), *Pease.*

New Brunswick to Pennsylvania and Lake Superior.

Ref. Eaton, 15, 63.

Orthotrichum anomalum Hedw.

Rocks in the open. Spring. LITCHFIELD: Salisbury, *Nichols.* NEW HAVEN: Branford (1881), *J. A. Allen.*

Throughout Canada and the northern United States; Alaska; Europe; Asia; Africa.

Orthotrichum Lescurii Aust. *O. cupulatum* Hoffm. var. *minus* Sull.

Dry shaded granite or trap rocks. Spring. NEW HAVEN: Hamden (1876), *Pease;* Woodbridge, *Eaton.*

Ontario and New England, south to Pennsylvania and Missouri, and in the Rocky Mountain region.

REF. Austin, 3, 341. Eaton, 15, 63.

Orthotrichum pusillum Mitt. *O. psilocarpum* James.

On trunks of trees. Spring. NEW HAVEN: New Haven (1877), *J. A. Allen;* Oxford, *Harger.*

New England and New York to Georgia, west to Missouri.

REF. Eaton, 15, 63. Rau & Hervey, 64, 21.

Orthotrichum Braunii Br. & Sch. *O. strangulatum* Sull. not Beauv.

Trunks of trees. Spring. TOLLAND: Ellington, *Pease.* WINDHAM: Canterbury, *Mrs. Hadley.* NEW HAVEN: New Haven (1886), *Eaton.*

Prince Edward Island to Georgia, westward to Iowa; Europe; Asia; Africa.

REF. Eaton, 15, 63.

Orthotrichum ohioense Sull. & Lesq.

Trunks of trees. Spring. HARTFORD: Southington, *Chamberlain.* TOLLAND: Ellington, *Pease.* FAIRFIELD: Trumbull, *Eames.* NEW HAVEN: Hamden (1875), *Young;* Madison, *Nichols;* New Haven, *Pease.* MIDDLESEX: Chester and Killingworth, *Nichols.* NEW LONDON: Groton and North Stonington, *C. B. Graves.*

Prince Edward Island to Georgia, west to Michigan.

REF. Eaton, 15, 63.

Orthotrichum pumilum Sw.

On trees. Spring. Litchfield: Salisbury (1907), *Nichols.*

New England and Ontario to Idaho, south to Florida and Texas; Europe; Asia; Africa.

Ulota Mohr

1. Leaves rigid when dry; plants growing on rocks . **U. Hutchinsiæ**
   Leaves crispate when dry; plants growing on trees....... 2
2. Capsule smooth, slightly plicate only below the narrowed mouth .... **U. Ludwigii**
   Capsule longitudinally plicate throughout, mouth wide.... 3
3. Capsule constricted below the mouth, gradually narrowed toward the neck when dry and empty........ **U. ulophylla**
   Capsule slightly or not at all contracted below the mouth, abruptly narrowed toward the neck........... **U. crispula**

Ulota Hutchinsiæ (Sm.) Hammar. *U. americana* (Beauv.) Limpr.. Not Mitt.

Non-calcareous rocks in mountainous or hilly districts. Spring. Litchfield: Kent, *Eames;* New Milford, *Nichols;* Salisbury, *Gilman.* Hartford: Hartford, *Mrs. Lowe.* Tolland: Ellington, *Pease;* Stafford, *Nichols.* Windham: Canterbury, *Mrs. Hadley.* Fairfield: Danbury, *Nichols;* Darien, *Mrs. Lowe;* Sherman, *Nichols.* New Haven: Madison and Meriden, *Nichols;* New Haven (1854), *Eaton;* Oxford, *Harger.* Middlesex: Killingworth, *Nichols.* New London: Groton and Waterford, *C. B. Graves.*

New Brunswick to Georgia, westward to the Rocky Mountains; Europe; Asia.

Ref. Eaton, 15, 63.

Ulota Ludwigii Brid.

Trunks of trees in mountainous or hilly woods. Summer. Litchfield: Salisbury, *Nichols.* Windham: Canterbury, *Mrs. Hadley.* New Haven: Branford, *Eaton;* East Haven, *J. A. Allen;* Hamden and Woodbridge (1866), *Eaton.* Middlesex: Chester and Killingworth, *Nichols.*

Newfoundland to Ontario and North Carolina; Europe.

Ref. Eaton, 15, 63.

Ulota ulophylla (Ehrh.) Broth. *U. crispa* (Hedw.) Brid.

Trees in the woods. Summer. LITCHFIELD: Salisbury, *Nichols*. WINDHAM: Canterbury, *Mrs. Hadley*. NEW HAVEN: North Haven, *Nichols;* Oxford, *Harger*. MIDDLESEX: Chester and Killingworth, *Nichols*. NEW LONDON: East Lyme and North Stonington (1894), *C. B. Graves*.

Newfoundland to Wisconsin, south to Georgia; Alaska; Europe; Asia; Canary Islands.

REF. Eaton, 15, 63.

Ulota crispula Bruch.

Trees in the woods. Summer. HARTFORD: Hartford, *Mrs. Lowe*. WINDHAM: Canterbury, *Mrs. Hadley*. NEW HAVEN: Woodbridge (1866), *Eaton*. MIDDLESEX: Saybrook, *Eaton*.

Same range as the preceding species.

REF. Eaton, 15, 63.

FAMILY FUNARIACEÆ

Ephemerum Hampe

1. Leaves without a midrib 2
   Midrib present, percurrent or nearly so ...... **E. crassinervium**
2. Leaves obscurely serrulate; stomata present in upper half of capsule .... **E. megalosporum**
   Leaves distinctly serrulate; stomata restricted to base of capsule .... **E. serratum**

Ephemerum megalosporum (Aust.) Salm. *Micromitrium megalosporum* Aust.

Wet or periodically inundated earth. Autumn. NEW HAVEN: Orange (1891), *Evans*.

Connecticut to Georgia.

Ephemerum serratum (Schreb.) Hampe.

Wet, clayey earth. Autumn. NEW HAVEN: East Haven, *Evans;* New Haven, *Nichols;* Orange, *Eaton;* Oxford, *Harger*. NEW LONDON: Norwich (1888), *Setchell*.

Probably throughout temperate North America; Europe.

Ephemerum crassinervium (Schwaegr.) C. Müll.

Damp earth in fields. Autumn. NEW HAVEN: East Haven (1891), *Evans*.

New England to Minnesota, south to Florida.

Aphanorrhegma Sull.

Aphanorrhegma serratum (Hook. & Wils.) Sull.

Moist, sandy soil in fields. Autumn. FAIRFIELD: Danbury, *Nichols.* MIDDLESEX: Cromwell (1900), *Evans.*

Temperate North America.

Physcomitrium (Brid.) Br. & Sch.

Physcomitrium turbinatum (Michx.) C. Müll. *P. pyriforme* of some authors.

On earth in gardens and fields. May-June. LITCHFIELD: Salisbury, *Nichols.* HARTFORD: Hartford (1855), *Eaton.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Darien, *Mrs. Lowe;* Stratford, *Eames.* NEW HAVEN: New Haven, *Eaton;* North Branford, *Evans;* North Haven, *Nichols;* Oxford, *Harger.* NEW LONDON: New London, *C. B. Graves.*

Quebec to Florida, and west to the Rocky Mountains.

REF. Eaton, **15**, 63. Mrs. Hadley, **40.**

Funaria Schreb.

Funaria hygrometrica (L.) Schreb.

Earth in fields, along roadsides, in burnt-over woods and waste places. May-June. LITCHFIELD: New Milford and Salisbury, *Nichols.* HARTFORD: Hartford, *Miss Lorenz;* Windsor, *W. E. Britton.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Darien, *Mrs. Lowe;* Stratford, *Eames.* NEW HAVEN: Beacon Falls, *Nichols;* New Haven (1856), *Eaton;* Orange, *Evans.*

Throughout North America; a cosmopolitan.

REF. Eaton, **15**, 63.

FAMILY BRYACEÆ

Leptobryum (Br. & Sch.) Wils.

Leptobryum pyriforme (L.) Wils.

On moist shaded soil or old walls and on rotten wood. June-July. LITCHFIELD: Salisbury, *Nichols.* HARTFORD: Hartford, *Miss Lorenz.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Darien, *Mrs. Lowe.* NEW HAVEN: Branford, *O. D. Allen;* New Haven (1855), *Eaton;* Orange, *Evans.*

Throughout North America; South America; Europe; Asia; Tasmania; New Zealand.

REF. Eaton, 15, 63.

Pohlia Hedw.

1. Plants producing gemmæ in axils of leaves, rarely fruiting **P. proligera**
   Plants not gemmiparous, richly fruiting 2
2. Basal membrane of inner peristome one-third to one-half height of segments .... **P. nutans**
   Basal membrane of inner peristome one-fourth height of segments .... **P. cruda**

Pohlia cruda (L.) Lindb.

Shaded earth and fissures of rocks in mountainous or hilly regions. Early summer. NEW HAVEN: Derby (1881), *J. A. Allen.*

Greenland to Pennsylvania, and westward to the Pacific; found in most quarters of the globe.

Pohlia nutans (Schreb.) Lindb. *Webera nutans* Hedw.

Soil and decaying wood in fields or woods. Early summer. LITCHFIELD: Salisbury, *Gilman.* HARTFORD: Southington, *Chamberlain.* TOLLAND: Stafford and Vernon, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Darien, *Mrs. Lowe.* NEW HAVEN: Beacon Falls and East Haven, *Nichols;* New Haven (1874), *Kleeberger;* North Haven, *Evans;* Oxford, *Harger;* Woodbridge, *J. A. Allen.* MIDDLESEX: Durham, *Evans.* NEW LONDON: Ledyard, *C. B. Graves.*

Throughout most of North America; a cosmopolitan.

REF. Eaton, 15, 63. Mrs. Hadley, 43.

Pohlia proligera Lindb.

On earth. Fruit rare, summer. NEW HAVEN: Beacon Falls and Hamden, *Nichols;* New Haven (1905), *Evans.*

Widely distributed throughout Canada and the United States; Alaska; Europe.

Mniobryum (Schimp.) Limpr.

Mniobryum albicans (Wahl.) Limpr. *Webera albicans* Schimp.

In swamps and on sandy banks of streams. Early summer. HARTFORD: Bloomfield and Farmington, *Mrs. Lowe.* FAIRFIELD: Darien, *Mrs. Lowe.* NEW HAVEN: Hamden (1855), *Eaton.*

Arctic America, Canada, and the northern United States; south in the east to Florida; found in most quarters of the globe.

REF. Eaton, 15, 63.

Bryum (Dill.) L.

1. Plants monoicous (synoicous); leaves with a broad border, midrib excurrent into a short point................**B. bimum**
   Plants dioicous 2
2. Midrib vanishing below the apex, leaves not bordered, or very indistinctly so ....**B. argenteum**
   Midrib excurrent (or frequently vanishing below the apex in *B. capillare*) 3
3. Leaves short-cuspidate, distinctly bordered....**B. ventricosum**
   Leaves long-cuspidate 4
4. Leaves bordered, twisted when dry..............**B. capillare**
   Leaves not bordered or only faintly so, scarcely twisted when dry ....**B. cæspiticium**

Bryum ventricosum Dicks. *B. pseudotriquetrum* (Hedw.) Schwaegr.

Wet, swampy places. Early summer. LITCHFIELD: Salisbury, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* NEW HAVEN: New Haven (1859), *Eaton.* MIDDLESEX: Killingworth, *Nichols.* NEW LONDON: Ledyard, *Nichols.*

Arctic America, Canada, and the northern United States; found all over the world.

EXSIC. Holzinger, Musci Acro. Bor.-Amer. No. 246 (as *B. pseudotriquetrum*).

REF. Eaton, 15, 63.

Bryum bimum Schreb.

On wet rocks and on the ground in swampy woods. Early summer. LITCHFIELD: Salisbury, *Nichols.* HARTFORD: Farmington, *Mrs. Lowe;* Plainville, *Chamberlain.* TOLLAND: Bolton, *Nichols;* Ellington, *Pease.* WINDHAM: Canterbury, *Mrs. Hadley.* New Haven: New Haven (1856), *Eaton.* New London: New London, *C. B. Graves.*

Arctic America, Canada, and southward to Florida and Arizona; a cosmopolitan.

Ref. Eaton, 15, 63.

Bryum cæspiticium L.

On the ground in old pastures and fields. Early summer. Litchfield: Salisbury, *Nichols.* Windham: Canterbury, *Mrs. Hadley.* Fairfield: Darien, *Mrs. Lowe;* Trumbull, *Eames.* New Haven: New Haven (1855), *Eaton;* Orange, *Nichols.* New London: New London, *C. B. Graves.*

Throughout North America; a cosmopolitan.

Ref. Eaton, 15, 63. Mrs. Lowe, **54.**

Bryum argenteum L.

On earth or earth-covered rocks. Autumn. Litchfield: Salisbury, *Nichols.* Hartford: West Hartford, *Miss Lorenz.* Tolland: Stafford, *Nichols.* Fairfield: Darien, *Mrs. Lowe;* Sherman, *Nichols.* New Haven: Hamden, *Evans;* Meriden, *Miss Lorenz;* New Haven (1854), *Eaton.* Middlesex: Old Lyme, *Nichols.*

Throughout North America; a cosmopolitan.

Ref. Eaton, 15, 63.

Bryum capillare L.

Rich, loamy soil, and roots of trees in the woods. Early summer. New Haven: Cheshire, *J. A. Allen;* East Haven, *Nichols;* Hamden (1879) *J. A. Allen.*

Throughout temperate North America, and north to the arctic regions; Mexico; Europe; Asia; Africa.

Rhodobryum (Schimp.) Hampe

Rhodobryum roseum (Weis) Limpr. *Bryum roseum* Schreb.

Rotten logs and humus in moist woods. Fruit occasional, autumn. Litchfield: New Milford, *Nichols;* Salisbury, *Gilman.* Hartford: Hartford, *Mrs. Lowe;* Southington, *Chamberlain.* Tolland: Stafford, *Nichols.* Windham: Canterbury, *Mrs. Hadley.* Fairfield: Danbury, *Eaton.*

New Haven: Hamden, *Evans;* Meriden, *Eaton;* Milford, *Harger;* New Haven (1855) and Orange, *Eaton;* Oxford, *Harger;* Woodbridge, *Nichols.* Middlesex: Killingworth, *Nichols.*

New Brunswick to Nebraska, south to Georgia; California; Europe; Asia; Africa.

Ref. Eaton, 15, 63.

FAMILY MNIACEÆ

Mnium (Dill.) L.

1. Leaf cells not arranged in oblique rows; border of leaves several cells thick; marginal teeth in pairs 2
Leaf cells tending to be arranged in diverging rows, gradually increasing in size from the border toward the midrib 5

2. Lid strongly convex, mammiform or apiculate; midrib toothed at back .... **M. hornum**
Lid rostrate 3

3. Midrib smooth at back; monoicous (synoicous) 4
Midrib toothed at back; dioicous .... **M. orthorrhynchum**

4. Perichætial leaves forming a rosette, not crispate when dry; capsules borne in clusters .... **M. spinulosum**
Perichætial leaves not forming a rosette, crispate when dry; capsules borne singly .... **M. marginatum**

5. Leaves serrate, teeth single, border one cell thick 6
Leaves entire 11

6. Monoicous (synoicous) 7
Dioicous 9

7. Lid rostrate; stomata scattered over the entire capsule .. **M. rostratum**
Lid strongly convex, apiculate; stomata present only on neck of capsule 8

8. Capsules borne singly; leaves serrate to middle .. **M. cuspidatum**
Capsules borne in clusters; leaves serrate to base .. **M. medium**

9. Margin of leaves obscurely toothed .... **M. rugicum**
Marginal teeth of 2-4 cells 10

10. Marginal teeth robust .... **M. affine**
Marginal teeth slender .... **M. ciliare**

11. Border narrow, scarcely thickened, of one layer of cells .. **M. cinclidioides**
Border broad, thickened .... **M. punctatum**

Mnium hornum L.

Moist banks and wet rocks in the woods. May-June. LITCHFIELD: Salisbury, *Gilman.* HARTFORD: East Hartford and Manchester, *Miss Lorenz.* TOLLAND: Ellington, *Pease.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Monroe, *Miss Lorenz.* NEW HAVEN: Beacon Falls, *Nichols;* East Haven (1875), *Eaton;* Hamden, *J. A. Allen;* New Haven and North Haven, *Nichols;* Orange, *Pease;* Oxford, *Harger.* MIDDLESEX: Killingworth, *Nichols.* NEW LONDON: Groton and Ledyard, *C. B. Graves;* Waterford, *Miss Lorenz.*

Newfoundland to Wyoming, and southward to Georgia; Europe; Asia; Africa.

REF. Mrs. E. G. Britton, **8**, 4. Eaton, **15**, 63. Mrs. Hadley, **40**.

Mnium orthorrhynchum Br. & Sch.

Rocks and soil, usually calcareous, in shaded ravines. July-Aug. LITCHFIELD: Salisbury, *Nichols.* NEW HAVEN: Wallingford (1874), *Barron.*

Arctic America, Canada, and the northern United States; Europe; Asia.

REF. Eaton, **15**, 63.

Mnium marginatum (Dicks.) Beauv. *M. serratum* Schrad.

Shaded banks and rocks near streams and in moist woods. May-June. LITCHFIELD: Cornwall, *Brewster;* Salisbury, *Gilman.* FAIRFIELD: Darien, *Mrs. Lowe.* NEW HAVEN: Ansonia, *J. A. Allen;* Cheshire, *Evans;* Hamden, *Eaton;* New Haven (1878), *J. A. Allen;* Orange, *Evans.* MIDDLESEX: Durham, *Evans.* NEW LONDON: Waterford, *C. B. Graves.*

Canada, Alaska, and the northern United States; Europe; Asia.

Mnium spinulosum Br. & Sch.

On the ground in evergreen mountain or hill woods. May-June. LITCHFIELD: Salisbury, *Gilman.* FAIRFIELD: Darien, *Mrs. Lowe.* NEW HAVEN: Hamden (1881), *J. A. Allen.*

Nova Scotia and the northern Atlantic States, westward to Alaska and Washington; Europe; Asia.

Mnium rostratum Schrad.

Shaded rocks in wet ravines. May-June. LITCHFIELD: Salisbury, *Nichols.* FAIRFIELD: Darien, *Mrs. Lowe;* Sherman, *Nichols.* NEW HAVEN: Hamden (1880), *J. A. Allen;* Woodbridge, *O. D. Allen.* MIDDLESEX: East Haddam, *C. B. Graves.* NEW LONDON: Waterford, *C. B. Graves.*

Throughout temperate North America, and in most temperate regions of the globe.

REF. Mrs. E. G. Britton, **8**, 5.

Mnium cuspidatum (L.) Leyss. *M. sylvaticum* Lindb.

Earth, stones, or old logs in moist woods. May-June. LITCHFIELD: New Milford and Salisbury, *Nichols.* HARTFORD: Hartford, *Mrs. Lowe;* Windsor, *W. E. Britton.* TOLLAND: Ellington, *Pease;* Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Darien, *Mrs. Lowe;* Fairfield, *Eames;* Monroe, *Miss Lorenz;* Sherman, *Nichols;* Trumbull, *Eames.* NEW HAVEN: East Haven (1875), *Eaton;* Madison, *Nichols;* New Haven, *Eaton;* North Branford and North Haven, *Evans.* MIDDLESEX: Killingworth, *Nichols.* NEW LONDON: Groton and Montville, *C. B. Graves;* Norwich, *Setchell;* Waterford, *C. B. Graves.*

Newfoundland to Florida and westward to the Pacific; Europe; Asia.

REF. Eaton, **15**, 63. Mrs. Hadley, **41**.

Mnium medium Br. & Sch.

On earth or rotting stumps in moist, shaded places. May-June. LITCHFIELD: Norfolk (1877), *Eaton.* NEW HAVEN: New Haven, *Eaton.*

Greenland to Pennsylvania, westward to Alaska and California; Europe; Asia.

Mnium ciliare (Grev.) Lindb. *M. affine* var. *ciliare* C. Müll.

Moist sandy soil in woods. May-June. LITCHFIELD: Salisbury, *Gilman.* WINDHAM: Canterbury, *Mrs. Hadley.* NEW HAVEN: Beacon Falls and East Haven, *Nichols;* Hamden (1858), *Eaton;* Woodbridge, *Chatterton.*

Nova Scotia to Louisiana, westward to British Columbia; Europe; Asia.

Exsic. Holzinger, Musci Acro. Bor.-Amer. No. 247.

Ref. Mrs. E. G. Britton, **8**, 5.

Mnium affine Bland.

Moist earth and rocks in woods and swamps. May-June. Litchfield: Salisbury, *Gilman.* Hartford: Hartford, *Mrs. Lowe;* Southington, *Chamberlain.* Tolland: Stafford, *Nichols.* Windham: Canterbury, *Mrs. Hadley.* New Haven: Ansonia, *J. A. Allen;* Beacon Falls and East Haven, *Nichols;* Hamden (1865), *Eaton;* Orange, *Evans;* Woodbridge, *J. A. Allen.* Middlesex: Durham, *Evans;* Killingworth, *Nichols.*

Throughout northern North America, south to Florida and California; Europe; Asia; Africa.

Ref. Eaton, **15**, 63.

Mnium rugicum Laur. *M. affine* var. *rugicum* Br. & Sch.

On the ground in shaded swamps and ravines. May-June. Fairfield: Sherman, *Nichols.* New Haven: Hamden (1880), *Eaton;* Woodbridge, *Setchell.*

Greenland and Labrador to Alaska, south to Louisiana and Colorado; Europe.

Mnium punctatum (L.) Hedw.

On the ground in swamps or wet woods. Spring. Litchfield: Salisbury, *Gilman.* Hartford: East Hartford, *Miss Lorenz;* Hartford, *Mrs. Lowe;* Windsor, *Miss Lorenz.* Windham: Canterbury, *Mrs. Hadley;* Windham, *Nichols.* New Haven: Bethany, *O. D. Allen;* Cheshire, *Eaton;* Derby, *Eames;* Hamden (1855), *Eaton;* Orange, *Nichols;* Oxford, *Harger;* Woodbridge, *Eaton.* Middlesex: Killingworth, *Nichols.* New London: Groton, *C. B. Graves;* Ledyard, *Nichols;* Montville, Stonington, and Waterford, *C. B. Graves.*

Var. **elatum** Schimp.

Litchfield: Norfolk, *Eaton;* Salisbury, *Nichols.* Tolland: Stafford, *Nichols.* Windham: Canterbury, *Mrs. Hadley;* Thompson, *Miller.* New Haven: Beacon Falls, *Nichols;* Hamden (1875) *Eaton.*

Arctic America, Canada, and the northern United States; Europe; Asia.

REF. Mrs. E. G. Britton, **8**, 5. Eaton, **15**, 64.

Mnium cinclidioides Hüben.

Swamps, pools, and wet places in the woods. Fruit rare, June. LITCHFIELD: Litchfield, *T. F. Allen.* HARTFORD: Farmington (1859), *Eaton.* NEW HAVEN: Beacon Falls, *Nichols;* East Haven, *J. A. Allen;* Hamden and Orange, *Eaton;* Oxford, *Harger.* MIDDLESEX: Killingworth, *Nichols;* Saybrook, *Eaton.* NEW LONDON: Norwich, *Harger.*

Northern North America, south in the east to Pennsylvania; Europe; Asia.

REF. Eaton, **15**, 64.

FAMILY AULACOMNIACEÆ

Aulacomnium Schwaegr.

Monoicous; leaves coarsely serrate in upper half; plants not gemmiparous .... **A. heterostichum**

Dioicous; leaves serrulate near apex; sterile plants frequently producing gemmæ at the tips of flagelliform branches .... **A. palustre**

Aulacomnium heterostichum (Hedw.) Br. & Sch.

Moist banks and roots of trees in the woods. May-June. LITCHFIELD: New Milford, *Nichols;* Salisbury, *Gilman.* HARTFORD: Burlington, *Nichols;* Farmington, *Mrs. Lowe;* Hartford, *Miss Lorenz;* Southington, *Chamberlain;* Windsor, *Rorer.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Danbury, *Nichols;* Darien, *Mrs. Lowe.* NEW HAVEN: Ansonia, *J. A. Allen;* Beacon Falls, *Nichols;* East Haven, *Evans;* Hamden (1858), *Eaton;* Madison and Meriden, *Nichols;* New Haven, *J. A. Allen;* Woodbridge, *Setchell.* MIDDLESEX: Killingworth, *Nichols.* NEW LONDON: East Lyme, *C. B. Graves;* Ledyard, *Nichols;* North Stonington, *C. B. Graves.*

Ontario to Wisconsin, south to Florida and Texas; Asia.

REF. Eaton, **15**, 64.

Aulacomnium palustre (L.) Schwaegr.

In bogs and swampy woods. June. LITCHFIELD: Salisbury, *Nichols.* HARTFORD: Canton, *Nichols;* Farmington, *Mrs. Lowe;* West Hartford, *Miss Lorenz.* TOLLAND: Ellington, *Pease;* Willington, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Darien, *Mrs. Lowe;* Stratford, *Nichols.* NEW HAVEN: East Haven, *Eaton;* Madison, *Miss Lorenz;* Meriden, *Nichols;* New Haven (1855), *Eaton;* Oxford, *Harger.* MIDDLESEX: Chester, *Nichols;* Durham, *Evans;* Killingworth, *Nichols.* NEW LONDON: North Stonington, Old Lyme, and Waterford, *C. B. Graves.*

Arctic America, southward to the mountains of South Carolina, Utah, and California; South America; Europe; Asia; Australia.

REF. Eaton, **15**, 64. Mrs. Hadley, **40**.

FAMILY MEESIACEÆ

Meesia Hedw.

Meesia triquetra (L.) Aongstr. *M. tristicha* Br. & Sch.

In wet meadows and peat bogs. June-July. HARTFORD: Berlin (1875), *Coleman.* NEW HAVEN: New Haven, *J. A. Allen.*

Arctic America, Canada, and the northern United States; Europe; Asia.

REF. Eaton, **15**, 64.

FAMILY BARTRAMIACEÆ

Plagiopus Brid.

Plagiopus Oederi (Gunn.) Limpr. *Bartramia Oederi* Sw.

Moist calcareous rocks or soil in mountainous and hilly woods. Spring. LITCHFIELD: Salisbury, *Gilman.* HARTFORD: West Hartford, *Miss Lorenz.* FAIRFIELD: Monroe, *Harger;* Sherman, *Nichols.* NEW HAVEN: Cheshire (1856), *Eaton;* Hamden, *J. A. Allen;* Meriden, *Eaton.*

Canada and the northern United States, south in the east to North Carolina; Europe; Asia.

REF. Eaton, **15**, 64.

Bartramia Hedw.

Bartramia pomiformis (L.) Hedw.

Rocks or soil in moist woods. Spring. LITCHFIELD: New Milford, *Nichols;* Salisbury, *Gilman.* HARTFORD: Hartford, *Mrs. Lowe;* Southington, *Chamberlain;* West Hartford, *Miss Lorenz;* Windsor, *W. E. Britton.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Huntington and Sherman, *Nichols;* Trumbull, *Eames.* NEW HAVEN: Beacon Falls and East Haven, *Nichols;* Hamden, *Eaton;* Madison and Meriden, *Nichols;* New Haven (1855), *Eaton;* North Haven, *Nichols;* Oxford, *Harger.* MIDDLESEX: Killingworth, *Nichols.* NEW LONDON: Ledyard, *Nichols;* North Stonington, *C. B. Graves.*

Arctic America and Canada, southward to Alabama and Colorado; South America; Europe; Asia; Africa; New Zealand.

REF. Eaton, 15, 64.

Philonotis Brid.

Philonotis fontana (L.) Brid.

In swamps or wet places and on dripping rocks, rarely on limestone. Fruit occasional, June. LITCHFIELD: New Milford, *Nichols;* Salisbury, *Todd.* HARTFORD: Hartford and Windsor, *Miss Lorenz.* TOLLAND: Bolton, *Nichols;* Ellington, *Pease;* Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley;* Windham, *Nichols.* FAIRFIELD: Easton, *Eames;* Huntington, *Nichols;* Redding, *Evans.* NEW HAVEN: Beacon Falls, *Nichols;* Hamden, *Eaton;* Meriden, *Nichols;* New Haven (1856) and North Branford, *Eaton.* MIDDLESEX: Killingworth, *Nichols.* NEW LONDON: Groton and Ledyard, *C. B. Graves.*

Arctic and temperate North America, south in the east to Florida; a cosmopolitan.

REF. Eaton, 15, 64.

FAMILY TIMMIACEÆ

Timmia Hedw.

Timmia cucullata Michx. *T. megapolitana* of American authors, in part.

On moist shaded banks, especially in limestone regions. Spring. LITCHFIELD: Cornwall, *Hall;* Salisbury, *Gilman.* HARTFORD: Windsor, *Miss Lorenz.* NEW HAVEN: Hamden, *Eaton;* Woodbridge (1878), *Brewster.*

Newfoundland to Pennsylvania and westward to the Pacific; Europe.

EXSIC. Renauld & Cardot, Musci Amer. Sept. No. 183 (as *T. bavarica* var. *cucullata*).

REF. Eaton, 15, 72.

FAMILY HEDWIGIACEÆ

Hedwigia Ehrh.

Hedwigia albicans (Web.) Lindb. *H. ciliata* Ehrh.

On rocks and bowlders of various kinds, but never on limestone. Spring. LITCHFIELD: New Milford and Salisbury, *Nichols.* HARTFORD: Hartford, *Mrs. Lowe;* Plainville, *Chamberlain.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Danbury, *Nichols;* Darien, *Mrs. Lowe;* Huntington, *Nichols;* Stratford, *Eames.* NEW HAVEN: East Haven, *Evans;* Hamden, *Eaton;* Madison and Meriden, *Nichols;* New Haven and Orange (1873), *Eaton.* MIDDLESEX: Killingworth, *Nichols.* NEW LONDON: Ledyard, *Nichols;* Waterford, *C. B. Graves.*

Throughout North America, and in most quarters of the globe.

REF. Eaton, 15, 62.

FAMILY FONTINALACEÆ

Fontinalis (Dill.) L.

1. Stem leaves keeled.......................... **F. antipyretica**
   Leaves not keeled.......................... 2
2. Leaves 2-3 mm. long, firm, very concave throughout and incurved at the margins.......................... **F. dalecarlica**
   Leaves 3.5-7 mm. long, slightly concave.......................... 3
3. Branches obliquely spreading; leaves flaccid, plane in the upper half.......................... **F. Lescurii**
   Branches widely spreading; leaves firmer, concave throughout.......................... **F. Novæ-Angliæ**

Fontinalis antipyretica L. var. **gigantea** Sull.

On stones and wood in flowing water. Fruit occasional, summer. LITCHFIELD: Goshen, *Underwood;* Salisbury, *Mrs. Phelps.* HARTFORD: Burlington and Granby, *Nichols;* West Hartford, *Miss Lorenz.* TOLLAND: Bolton, *Nichols;* Somers, *Pease;* Stafford, *Nichols.* NEW HAVEN: Bethany, *Eaton;* Cheshire, *Nichols;* Hamden, *J. A. Allen;* New Haven (1856), *Smith;* Orange and Oxford, *Harger.*

Canada and the northern United States; Europe; Asia; Africa.

REF. Eaton, **15**, 65.

Fontinalis dalecarlica Schimp.

On stones in rapid mountain or hill streams. Summer. LITCHFIELD: Salisbury, *Nichols.* HARTFORD: Burlington, *Nichols;* West Hartford, *Miss Lorenz.* TOLLAND: Vernon, *Nichols.* NEW HAVEN: Beacon Falls, *Nichols;* Hamden (1866), *Eaton.* MIDDLESEX: Chester and Killingworth, *Nichols.* NEW LONDON: Ledyard, *C. B. Graves.*

Greenland and Labrador to Kansas, south to Alabama; Europe.

REF. Eaton, **15**, 65.

Fontinalis Novæ-Angliæ Sull.

Pools and running water in streams. Summer. LITCHFIELD: Salisbury, *Nichols.* HARTFORD: Burlington, *Nichols.* TOLLAND: Vernon, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* NEW HAVEN: Beacon Falls, *Nichols;* Bethany, *Eaton;* East Haven, *Nichols;* Hamden, *J. A. Allen;* Meriden and New Haven (1855), *Eaton;* Orange, *J. A. Allen.* NEW LONDON: Groton, *C. B. Graves.*

Newfoundland to Ontario, and south to North Carolina.

REF. Eaton, **15**, 65. Lesquereux & James, **50**, 271. Sullivant, **68**, 654 (as *F. biformis* Sull.); **69**, 54 (as *F. biformis*), 104; **70**, 105.

Fontinalis Lescurii Sull.

On stones in streams. Summer. LITCHFIELD: Salisbury, *Nichols.* HARTFORD: Bloomfield, *Miss Lorenz;* Burlington, *Nichols.* TOLLAND: Stafford, *Nichols.* NEW HAVEN: Beacon Falls, *Nichols;* Derby, *O. D. Allen;* Hamden, *J. A. Allen;* New Haven (1855), *Eaton;* Wallingford, *Barron;* Woodbridge, *Eaton.* MIDDLESEX: Killingworth, *Nichols.*

Nova Scotia to Alabama, westward to the Rocky Mountains.

REF. Eaton, **15**, 65.

Dichelyma Myrin

Dichelyma capillaceum (L.) Schimp.

On bushes and sticks in ponds and water holes. Summer. TOLLAND: Stafford and Willington, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* NEW HAVEN: Branford and East Haven, *Eaton;* Hamden, *Nichols;* New Haven (1855) and Orange, *Eaton.* MIDDLESEX: Saybrook, *Eaton.* NEW LONDON: North Stonington and Waterford, *C. B. Graves.*

New Brunswick to Ontario and Pennsylvania; Europe.

EXSIC. Renauld & Cardot, Musci Amer. Sept. No. 187.

REF. Eaton, **15**, 65.

FAMILY CRYPHÆACEÆ

Cryphæa Mohr

Cryphæa glomerata Br. & Sch.

Trunks of trees in the woods. Spring. NEW HAVEN: Hamden (1875), *Young.*

Connecticut to Ohio, south to the Gulf of Mexico.

REF. Eaton, **15**, 64. Rau, **63**, 152. Rau & Hervey, **64**, 52.

FAMILY LEUCODONTACEÆ

Leucodon Schwaegr.

Capsule exserted beyond the perichætial leaves....**L. julaceus**
Capsule exserted but surpassed by the perichætial leaves.. **L. brachypus**

Leucodon julaceus (L.) Sull.

Trunks of trees in the woods. Autumn. WINDHAM: Canterbury, *Mrs. Hadley.* NEW HAVEN: New Haven (1855), *Eaton;* North Branford, *Harger;* Orange, *Eaton;* Oxford, *Harger.* NEW LONDON: North Stonington, *C. B. Graves.*

New England to Michigan, south to Florida and Texas.

REF. Eaton, 15, 65.

Leucodon brachypus Brid.

Trees and rocks in mountainous or hilly woods. Fruit rare, autumn. LITCHFIELD: Salisbury, *Nichols*. HARTFORD: Canton, *Nichols;* Hartford, *Miss Lorenz*. WINDHAM: Canterbury, *Mrs. Hadley*. NEW HAVEN: Guilford and New Haven (1856), *Eaton*. MIDDLESEX: Killingworth, *Nichols*.

Nova Scotia to Kansas, south to the Gulf States.

REF. Eaton, 15, 65.

Forsstroemia Lindb.

Forsstroemia trichomitria (Hedw.) Lindb. *Leptodon trichomitrion* Mohr.

On trees in the woods, rarely on rocks. Autumn. HARTFORD: Hartford, *Mrs. Lowe;* West Hartford, *Miss Lorenz*. NEW HAVEN: Cheshire, *Eaton;* Hamden, *J. A. Allen;* New Haven, *Evans;* North Haven, *Eaton;* Orange, *J. A. Allen;* Waterbury (1855), *Blackman;* Woodbridge, *Evans*. MIDDLESEX: Saybrook, *Eaton*.

Ontario and New England, south to the Gulf States; Asia.

REF. Eaton, 15, 65.

FAMILY NECKERACEÆ

Neckera Hedw.

Neckera pennata (L.) Hedw.

On trees and moist rocks in mountainous or hilly woods. Autumn. LITCHFIELD: Salisbury, *Gilman*. HARTFORD: Hartford, *Miss Lorenz*. WINDHAM: Canterbury, *Mrs. Hadley*. NEW HAVEN: Branford, East Haven, and New Haven (1855), *Eaton;* Southbury, *Harger;* Woodbridge, *Evans*. MIDDLESEX: Chester, *Nichols;* Saybrook, *Eaton*.

Nova Scotia to Manitoba and Yukon Territory, south to North Carolina; found in most temperate regions of the world.

EXSIC. Renauld & Cardot, Musci Amer. Sept. No. 188.

REF. Eaton, 15, 65.

Homalia (Brid.) Br. & Sch.

Homalia Jamesii Schimp.

Rocks and crevices in mountainous or hilly districts. Autumn. LITCHFIELD: Salisbury, *Miss Lorenz.* NEW HAVEN: Hamden (1881), *J. A. Allen.*

Newfoundland and Nova Scotia to Pennsylvania; Washington.

FAMILY ENTODONTACEÆ

Schwetschkeopsis Broth.

Schwetschkeopsis denticulata (Sull.) Broth. *Leskea denticulata* Sull.

At the base of trees or on rocks. Fruit rare. NEW HAVEN: Orange (1880), *O. D. Allen.*

Connecticut and New York to Florida, west to the Mississippi River; Asia.

Platygyrium Br. & Sch.

Platygyrium repens (Brid.) Br. & Sch.

On roots and trunks of trees, especially chestnut and beech, on old logs, stumps, and stones. Autumn. LITCHFIELD: Salisbury, *Nichols.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Sherman, *Nichols.* NEW HAVEN: East Haven, *O. D. Allen;* Hamden, *Evans;* New Haven (1855), *Eaton;* North Haven, *Evans;* Oxford, *Harger.* MIDDLESEX: Middlefield, *Evans.* NEW LONDON: New London, *C. B. Graves.*

North America, west to the Rocky Mountains; Europe; Asia; Africa.

REF. Eaton, 15, 66.

Entodon C. Müll.

Branches usually complanate; annulus clearly differentiated; teeth 12-18-articulate .... **E. cladorrhizans**

Branches usually terete; annulus not clearly defined; teeth 7-10-articulate .... **E. seductrix**

Entodon cladorrhizans (Hedw.) C. Müll. *Cylindrothecium cladorrhizans* Schimp.

On decaying logs, on stones, and at the base of trees in moist woods. Autumn. LITCHFIELD: Salisbury, *Nichols.* HARTFORD: Southington, *Chamberlain.* TOLLAND: Ellington, *Pease.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Danbury, *Nichols.* NEW HAVEN: Hamden, *J. A. Allen;* Madison, *Nichols;* Orange, *Eaton;* Oxford, *Harger;* Woodbridge (1866), *Eaton.*

New Brunswick to Minnesota, and south to the Gulf States; Europe.

REF. Eaton, 15, 66.

Entodon seductrix (Hedw.) C. Müll. *Cylindrothecium seductrix* Sull.

On decaying wood, earth, rocks, and roots of trees in moist woods. Autumn. HARTFORD: Hartford, *Miss Lorenz.* TOLLAND: Bolton and Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Danbury, *Eaton;* Darien, *Mrs. Lowe;* Sherman, *Nichols.* NEW HAVEN: East Haven, Hamden, and Madison, *Nichols;* New Haven and Orange (1855), *Eaton;* Oxford, *Harger;* Woodbridge, *J. A. Allen.* MIDDLESEX: Killingworth, Nichols.

New England to Minnesota, south to Florida and Texas.

EXSIC. Grout, N. Amer. Musci Pleuro. Nos. 51, 173.

REF. Eaton, 15, 66.

Pylaisia Br. & Sch.

1. Segments of inner peristome entirely free from teeth, basal membrane distinct; spores 0.008-0.012 mm. in diameter .... **P. subdenticulata**
   Segments of inner peristome partially or wholly adherent to teeth, basal membrane obscure or lacking............ 2
2. Partially adherent; spores 0.016-0.024 mm. in diameter.... **P. Schimperi**
   Wholly adherent; spores 0.025-0.032 mm. in diameter..... **P. intricata**

Pylaisia Schimperi Card. *P. intricata* of some authors.

Bark of trees or decaying wood in the woods or in the open. Autumn. LITCHFIELD: New Milford and Salisbury, *Nichols.* HARTFORD: Canton, *Nichols;* Hartford, *Miss Lo-*

rens; Southington, *Nichols.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Darien, *Mrs. Lowe.* NEW HAVEN: Branford (1874), *Kleeberger;* East Haven, *Evans;* Hamden, *Eaton;* New Haven, *J. A. Allen;* Orange and Woodbridge, *Veitch.* MIDDLESEX: Chester, *Nichols.* NEW LONDON: New London, *C. B. Graves.*

New Brunswick to the Gulf States, westward to the Rocky Mountains; Europe; Asia.

REF. Eaton, 15, 66.

Pylaisia subdenticulata Schimp.

On rocks and at the base of trees in the woods. Autumn. TOLLAND: Ellington (1876), *Pease.* WINDHAM: Canterbury, *Mrs. Hadley.* NEW HAVEN: New Haven, *J. A. Allen.*

New England to Illinois, southward to Florida and New Mexico.

Pylaisia intricata (Hedw.) Br. & Sch. *P. velutina* Schimp.

On stumps and trees in mountainous or hilly woods. Autumn. LITCHFIELD: Salisbury, *Nichols.* NEW HAVEN: East Haven, *O. D. Allen;* Hamden, *Young;* Milford, *Harger;* New Haven (1855), *Eaton.*

Newfoundland to Ontario, south to North Carolina.

REF. Eaton, 15, 66.

Homalothecium Br. & Sch.

Homalothecium subcapillatum (Hedw.) Sull.

Trunks of trees in the woods. Autumn. FAIRFIELD: Darien, *Mrs. Lowe.* NEW HAVEN: Cheshire (1855), *Blackman;* East Haven and New Haven, *Eaton;* Woodbridge, *Pease.*

New England to North Carolina.

EXSIC. Grout, N. Amer. Musci Pleuro. No. 108.

REF. Eaton, 15, 66.

FAMILY FABRONIACEÆ

Anacamptodon Brid.

Anacamptodon splachnoides (Fröl.) Brid.

On trunks and decaying shelves of trees, in forks, around knot holes full of water, on old stumps and logs, from sea level to high altitudes. Local. Spring. Hartford: East Hartford, *Mrs. Lowe.* New Haven: Cheshire, Hamden, and New Haven, *Nichols;* Wallingford (1880), *O. D. Allen.*

New England to Alabama, west to Illinois and Texas; Europe; Asia.

Ref. Mrs. Lowe, 56.

FAMILY LESKEACEÆ

Thelia Sull.

1. Papillæ of leaves simple.......................... **T. hirtella**
   Papillæ of leaves variously divided at the tip............. 2
2. Leaves ciliate; plants growing on trees........... **T. asprella**
   Leaves not ciliate; plants growing on rocks and earth.... **T. Lescurii**

Thelia hirtella (Hedw.) Sull.

Stumps, roots, and trunks of trees in the woods. Autumn. Hartford: Southington, *Nichols.* Tolland: Ellington, *Pease;* Stafford, *Nichols.* Windham: Canterbury, *Mrs. Hadley.* Fairfield: Darien, *Mrs. Lowe;* Sherman, *Nichols.* New Haven: East Haven (1855), *Eaton;* Madison, *Basye;* New Haven, *J. A. Allen;* Oxford, *Harger;* Woodbridge, *Nichols.* Middlesex: Killingworth, *Nichols.* New London: Waterford, *C. B. Graves.*

Ontario and New England to Kansas, south to the Gulf States.

Ref. Eaton, 15, 65. Mrs. Hadley, 41.

Thelia asprella (Schimp.) Sull.

Stumps, roots, and trunks of trees in the woods. Autumn. Litchfield: Salisbury, *Nichols.* Hartford: Hartford, *Miss Lorenz.* Tolland: Ellington, *Pease;* Stafford, *Nichols.* Windham: Canterbury, *Mrs. Hadley.* Fairfield: Darien, *Mrs. Lowe.* New Haven: East Haven, *O. D. Allen;* Hamden, *Eaton;* Meriden, *Nichols;* New Haven (1855), *Eaton.* Middlesex: Killingworth, *Nichols.* New London: Norwich, *Setchell.*

Ontario and New England to Florida, west to Minnesota and Texas.

Ref. Eaton, 15, 65.

Thelia Lescurii Sull.

On trap ledges, flat rocks, and dry, sandy soil. Fruit rare, autumn. LITCHFIELD: New Milford, *Nichols*. HARTFORD: Farmington, *Miss Lorenz*. FAIRFIELD: Darien, *Mrs. Lowe*. NEW HAVEN: East Haven, *J. A. Allen;* New Haven (1877), *Eaton;* Oxford, *Harger*. NEW LONDON: Waterford, *C. B. Graves*.

Massachusetts to Missouri, south to the Gulf States.

REF. Eaton, **15**, 65. Grout, **38**. Rau & Hervey, **64**, 52.

Myurella Br. & Sch.

Leaves serrulate, obtuse, rarely short-apiculate.....**M. julacea**
Leaves spinulose-dentate, abruptly long-acuminate..**M. gracilis**

Myurella julacea (Vill.) Br. & Sch.

On rocky banks and in shady fissures of rocks, especially limestone, in mountainous or hilly districts. Fruit rare, July-Aug. NEW HAVEN: Branford and Woodbridge (1880), *J. A. Allen*.

Arctic America, Canada, and the northern United States; Europe; Asia.

Myurella gracilis (Weinm.) Lindb. *M. Careyana*. Sull.

Crevices of moist rocks, usually limestone, in mountainous or hilly regions. Fruit rare, spring. LITCHFIELD: Norfolk (1903), *Miss Lorenz;* Salisbury, *Evans*. HARTFORD: Windsor, *Miss Lorenz*. FAIRFIELD: Sherman, *Nichols*.

Nova Scotia to Minnesota, south to North Carolina; Europe; Asia.

Haplohymenium Doz. & Molk.

Haplohymenium triste (Cesati) Kindb. *Leskea tristis* Cesati. *Anomodon tristis* Sull.

On steep sunny rocks and at the base of trees. Not yet found fruiting in North America. LITCHFIELD: New Milford, *Nichols*. NEW HAVEN: East Haven (1856), Hamden, and New Haven, *Eaton;* North Branford, *Evans;* Woodbridge, *Eaton*.

Eastern United States; Europe; Asia.

REF. Eaton, **15**, 65.

Anomodon Hook. & Tayl.

1. Upper half of leaves lingulate, obtuse or short-apiculate, leaves spreading when moist.......................... 2
Upper half of leaves more or less tapering............... 3
2. Leaves apiculate and with large auricles at the base.... **A. apiculatus**
Leaves rounded at apex, base not auriculate........**A. minor**
3. Leaves blunt, apiculate, subsecund; branches tapering.... **A. attenuatus**
Leaves narrowly acuminate, spreading when moist; branches blunt ....**A. rostratus**

Anomodon apiculatus Br. & Sch.

On shaded rocks and at the base of trees. Autumn. LITCHFIELD: Salisbury (1900), *Gilman.*

Ontario and New England, south to Georgia; Europe; Asia.

Anomodon minor (Beauv.) Fürn. *A. obtusifolius* Br. & Sch.

On trees and rocks in the woods. Fruit rare, autumn. LITCHFIELD: Salisbury, *Nichols.* FAIRFIELD: Darien, *Mrs. Lowe;* Sherman, *Nichols.* NEW HAVEN: Cheshire, *Evans;* Orange (1875), *Eaton;* Oxford, *Harger.*

New Brunswick to South Dakota, south to Virginia; Asia.

REF. Chamberlain, 12, 78. Eaton, 15, 65.

Anomodon attenuatus (Schreb.) Hüben.

Rocks, stumps, and trees in the woods. Autumn. LITCHFIELD: New Milford, *Nichols;* Salisbury, *Gilman.* HARTFORD: West Hartford, *Miss Lorenz.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Danbury, *Nichols;* Darien, *Mrs. Lowe.* NEW HAVEN: Beacon Falls and Cheshire, *Nichols;* Hamden, *Eaton;* Meriden, *Nichols;* New Haven (1856), *Eaton;* Oxford, *Harger.* MIDDLESEX: Killingworth, *Nichols.* NEW LONDON: Ledyard, *Nichols.*

Newfoundland to Florida, west to British Columbia and Kansas; Cuba; Europe; Asia.

REF. Eaton, 15, 65.

Anomodon rostratus (Hedw.) Schimp.

At the base of trees and on rocks in the woods. Autumn. LITCHFIELD: Cornwall, *Brewster;* New Milford, *Nichols;* Salisbury, *Gilman.* HARTFORD: Farmington, *Mrs. Lowe;* Hartford, *Miss Lorenz.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Danbury, *Nichols;* Darien, *Mrs. Lowe;* Sherman, *Nichols.* NEW HAVEN: Beacon Falls, *Nichols;* Hamden, *J. A. Allen;* Meriden, *Nichols;* New Haven (1855), *Eaton;* Woodbridge, *Nichols.* MIDDLESEX: Killingworth, *Nichols.* NEW LONDON: North Stonington, *C. B. Graves.*

Canada to the Gulf of Mexico; Europe; Asia.

REF. Eaton, **15**, 65. Mrs. Hadley, **42**.

Leskea Hedw.

Leaves ovate-oblong, obtuse, not plicate.......... **L. obscura**
Leaves ovate-lanceolate, acute to acuminate, biplicate.... **L. polycarpa**

Leskea polycarpa Ehrh.

On roots and stones, trunks of trees, and decaying wood in wet places. May-June. TOLLAND: Ellington, *Pease.* FAIRFIELD: Darien, *Mrs. Lowe.* NEW HAVEN: New Haven, *Eaton;* Oxford, *Harger;* Wallingford (1878), *Barron.* NEW LONDON: New London, *Spaulding.*

Newfoundland to British Columbia, and southward; Europe; Asia.

EXSIC. Renauld & Cardot, Musci Amer. Sept. No. 192^c.

REF. Eaton, **15**, 65.

Leskea obscura Hedw.

Roots of trees, stones, and logs subject to inundation. May-June. LITCHFIELD: Salisbury, *Nichols;* Woodbury, *Eaton.* HARTFORD: Farmington, *Mrs. Lowe;* Hartford, *Miss Lorenz.* TOLLAND: Vernon, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* NEW HAVEN: East Haven, *Nichols;* Hamden, *O. D. Allen;* New Haven (1874), *Eaton;* North Haven, *Nichols;* Wallingford, *Barron.* MIDDLESEX: Killingworth and Portland, *Nichols.* NEW LONDON: New London, *C. B. Graves.*

New Brunswick, Ontario, and the United States east of the Rocky Mountains; Japan.

REF. Eaton, **15**, 65.

Rauia Aust.

Rauia scita (Beauv.) Aust. *Hypnum scitum* Beauv. *Thuidium scitum* Aust.

At the base of trees and on stones in the woods. Autumn. TOLLAND: Ellington, *Pease;* Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* NEW HAVEN: Hamden and New Haven, *J. A. Allen;* Orange, *Eaton;* Wallingford, *Barron;* Woodbridge (1866), *Eaton.*

Ontario and New England, south to North Carolina and Missouri.

REF. Eaton, **15**, 65.

Haplocladium C. Müll.

Stem leaves roundish-ovate, abruptly short-acuminate.... **H. virginianum**

Stem leaves ovate, gradually acuminate...... **H. microphyllum**

Haplocladium virginianum (Brid.) Broth. *Hypnum gracile* var. *lancastriense* Sull. & Lesq. *Thuidium virginianum* Lindb.

On the ground in open woods. May-June. LITCHFIELD: Salisbury, *Nichols.* HARTFORD: Canton, *Nichols.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Danbury, *Nichols;* Darien, *Mrs. Lowe.* NEW HAVEN: Beacon Falls and Meriden, *Nichols;* New Haven (1876), *Pease;* Orange, *Nichols;* Oxford, *Harger.* MIDDLESEX: Killingworth, *Nichols.* NEW LONDON: Montville, *C. B. Graves.*

Massachusetts to Wisconsin, south to Mexico; Europe.

EXSIC. Grout, N. Amer. Musci Pleuro. No. 172 (as *Thuidium virginianum*).

REF. Mrs. Lowe, **55**; **58**.

Haplocladium microphyllum (Sw.) Broth. *Hypnum gracile* Br. & Sch. *Thuidium gracile* Br. & Sch. *T. microphyllum* Best.

On rotten wood, bases of trees, stones, and the ground. Summer. NEW HAVEN: Woodbridge (1879), *J. A. Allen.*

New Brunswick to British Columbia, and southward to the Gulf of Mexico; Cuba; Jamaica; Europe; Asia.

REF. Limpricht, 51^2, 828.

Claopodium (Lesq. & James) Ren. & Card.

Claopodium pellucinerve (Mitt.) Best.

"On an old log in a swamp." FAIRFIELD: Darien (1903), *Mrs. Lowe.*

Known from but two other localities — North India and Yukon Territory.

REF. Miss Wheeler, 80.

Thuidium Br. & Sch.

1. Monoicous; plants small 2
   Dioicous; plants large, stems 6-10 cm. long 3
2. Stem 1-2 cm. long; branches papillose .... **T. pygmæum**
   Stem 2-4 cm. long; branches smooth .... **T. minutulum**
3. Stem pinnately branched; plants ascending ...... **T. abietinum**
   Stems mostly bipinnately branched; plants prostrate 4
4. Stem leaves abruptly acuminate, margin plane, midrib percurrent; perichætial leaves not ciliate .... **T. recognitum**
   Margin of stem leaves revolute, midrib vanishing below the apex 5
5. Branches densely paraphyllose; stem leaves gradually acuminate, coarsely papillose; perichætial leaves ciliate **T. delicatulum**
   Branches with few or no paraphyllia; stem leaves minutely papillose; perichætial leaves not ciliate .... **T. Alleni**

Thuidium pygmæum Br. & Sch. *Hypnum pygmæum* Sull.

Rocks or earth in the woods. Summer. NEW HAVEN: Cheshire (1879), *J. A. Allen.*

New England to Ohio; Canada; Asia.

Thuidium minutulum (Hedw.) Br. & Sch. *Hypnum minutulum* Hedw.

At the base of trees and on rotten logs in the woods. Autumn. NEW HAVEN: New Haven (1855) and Orange, *Eaton;* Oxford, *Harger;* Woodbridge, *Evans.*

New Brunswick to Minnesota, south to Florida and Mexico; Europe.

REF. Eaton, 15, 65.

Thuidium recognitum (Hedw.) Lindb. *Hypnum recognitum* Hedw.

On the ground, rotten wood, and rocks in moist woods. Nov.-Dec. LITCHFIELD: Salisbury, *Gilman.* HARTFORD: Hartford, *Mrs. Lowe.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Darien, *Mrs. Lowe.* NEW HAVEN: East Haven (1855), *Eaton;* Hamden, *J. A. Allen.* MIDDLESEX: Killingworth, *Nichols.*

Labrador to Yukon Territory, south in the east to Florida; Europe; Asia; Africa.

Thuidium delicatulum (L.) Br. & Sch. *Hypnum delicatulum* L.

On the ground, rocks, and rotten wood in moist woods. Nov.-Dec. LITCHFIELD: New Milford, *Nichols;* Norfolk, *Eaton;* Salisbury, *Gilman.* HARTFORD: Burlington, *Nichols;* West Hartford, *Miss Lorenz.* TOLLAND: Ellington, *Pease;* Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Danbury, *Nichols;* Darien, *Mrs. Lowe.* NEW HAVEN: East Haven and Hamden, *Eaton;* Madison, *Nichols;* New Haven, *J. A. Allen;* Orange, *Evans;* Oxford, *Harger;* Woodbridge (1875), *Eaton.* MIDDLESEX: Chester and Killingworth, *Nichols.* NEW LONDON: North Stonington and Waterford, *C. B. Graves.*

Labrador to the Rocky Mountains, south to the Gulf States and Mexico; West Indies; Central and South America; Europe; Asia.

REF. Eaton, 15, 65. Mrs. Lowe, 59.

Thuidium Alleni Aust. *Hypnum Alleni* Lesq. & James.

Peat bogs. Mature sporophyte unknown. NEW HAVEN: New Haven (1880), *J. A. Allen.*

Connecticut to Louisiana.

REF. Austin, 4, 15, 16. Grout, 37, 240. Lesquereux &

James, **50**, 327. Paris, **61**, 275; **62**^{5}, 3. Rau & Hervey, **64**, 52. Renauld & Cardot, **65**, 16.

Thuidium abietinum (L.) Br. & Sch. *Hypnum abietinum* L.

On rocks and the ground in dry, open woods, especially in calcareous districts. Spring; not yet found fruiting in the eastern United States. LITCHFIELD: Salisbury (1907), *Nichols.*

Greenland to Virginia, westward to Alaska and the Rocky Mountains; Europe; Asia.

Elodium (Sull.) Warnst.

Elodium paludosum (Sull.) Loeske. *Hypnum paludosum* Sull. *Thuidium paludosum* Jaeg. & Sauerb.

On the ground in swamps and bogs. June. HARTFORD: Canton, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Darien, *Mrs. Lowe;* Stratford, *Nichols.* NEW HAVEN: East Haven, *O. D. Allen;* Hamden and New Haven (1856), *Eaton;* Orange, *Evans;* Woodbridge, *Eaton.* MIDDLESEX: Chester, *J. A. Allen;* Middlefield, *Evans;* Saybrook, *Eaton.*

Ontario and New England, south to Delaware and Illinois; Asia.

EXSIC. Grout, N. Amer. Musci Pleuro. No. 156 (as *Thuidium paludosum*).

REF. Eaton, **15**, 66. Mrs. Hadley, **40.** Mrs. Lowe, **58.** Rau, **63**, 152.

FAMILY HYPNACEÆ

Camptothecium Br. & Sch.

Camptothecium nitens (Schreb.) Schimp. *Hypnum nitens* Schreb.

Swamps, bogs, and wet meadows. May-June. HARTFORD: Berlin (1875), *Coleman.*

Arctic America, Canada, and the northern United States; Europe; Asia.

REF. Eaton, **15**, 66.

Brachythecium Br. & Sch.

1. Stalk smooth throughout 2
Stalk more or less roughened 5
2. Dioicous 3
Monoicous 4
3. Capsules erect and symmetrical .... **B. acuminatum**
Capsules unsymmetrical, more or less inclined .. **B. oxycladon**
4. Stem leaves gradually narrowed from base to slender apex .... **B. acutum**
Stem leaves ovate-lanceolate .... **B. salebrosum**
5. Stalk rough above, nearly smooth below; monoicous 6
Stalk rough throughout with large, crowded papillæ 8
6. Midrib extending nearly to apex of leaf .... **B. populeum**
Midrib extending to middle of leaf or a little beyond 7
7. Cilia appendiculate .... **B. plumosum**
Cilia not appendiculate .... **B. campestre**
8. Dioicous 9
Monoicous 10
9. Cells of branch leaves about 5 times as long as broad, unipapillate .... **B. Novæ-Angliæ**
Cells of branch leaves at least 8 times as long as broad, smooth .... **B. rivulare**
10. Stem leaves lanceolate; cilia not appendiculate .. **B. velutinum**
Stem leaves ovate to triangular-ovate 11
11. Cilia not appendiculate .... **B. Rutabulum**
Cilia appendiculate .... **B. Starkei**

Brachythecium salebrosum (Hoffm.) Br. & Sch. *Hypnum salebrosum* Hoffm.

On rocks and earth, trunks and roots of trees, and decaying wood, in moist shaded places, especially in pine or hemlock woods. Autumn. HARTFORD: Farmington, *Mrs. Lowe.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Darien, *Mrs. Lowe.* NEW HAVEN: Cheshire and East Haven, *Nichols;* Guilford, Hamden, and New Haven (1856), *Eaton;* North Haven, *Harger;* Orange, *Nichols;* Woodbridge, *Evans.* NEW LONDON: North Stonington, *C. B. Graves.*

Arctic America, Canada, and southward to South Carolina and Missouri; Europe; Asia; Africa.

REF. Eaton, 15, 66.

Brachythecium campestre (C. Müll.) Br. & Sch. *Hypnum campestre* Bruch.

Wet non-calcareous rocks, moist banks, or decaying logs. Winter. LITCHFIELD: Salisbury, *Nichols*. NEW HAVEN: Hamden (1876), *Pease;* New Haven, *Eaton;* North Branford, *J. A. Allen*. NEW LONDON: New London, *C. B. Graves*.

Canada and the northern United States, south to the mountains of Alabama and Colorado; Europe; Asia; Africa.

REF. Eaton, 15, 66.

Brachythecium acutum (Mitt.) Sull. *Hypnum acutum* Mitt.

On rotten logs and earth in moist places. Autumn. NEW HAVEN: New Haven (1875), *Pease*.

Canada and the northern United States, south to Arkansas.

Brachythecium oxycladon (Brid.) Jaeg. & Sauerb. *Hypnum lætum* Brid. *Brachythecium lætum* Br. & Sch.

Earth, rocks, and roots of trees in open woods. Autumn. LITCHFIELD: New Milford, *Nichols*; Salisbury, *Evans*. TOLLAND: Somers, *Pease;* Stafford, *Nichols*. WINDHAM: Canterbury, *Mrs. Hadley*. FAIRFIELD: Darien, *Mrs. Lowe;* Huntington, Sherman, and Stratford, *Nichols*. NEW HAVEN: Cheshire (1856), *Eaton;* Hamden, *J. A. Allen;* New Haven and Orange, *Eaton;* Woodbridge, *Nichols*. MIDDLESEX: Killingworth, *Nichols;* Saybrook, *Eaton*. NEW LONDON: Waterford, *C. B. Graves*.

Newfoundland to Florida, westward to the Rocky Mountains; Europe.

REF. Eaton, 15, 66.

Brachythecium Rutabulum (L.) Br. & Sch. *Hypnum Rutabulum* L.

Earth, stones, trees, and rotting wood in shaded places. Winter. LITCHFIELD: Salisbury, *Nichols*. WINDHAM: Canterbury, *Mrs. Hadley*. FAIRFIELD: Darien, *Mrs. Lowe;* Sherman, *Nichols*. NEW HAVEN: Cheshire, *Nichols;* Hamden, *J. A. Allen;* New Haven (1855), *Eaton;* Oxford, *Harger*.

MIDDLESEX: Saybrook, *Eaton.* NEW LONDON: New London, *C. B. Graves.*

Newfoundland to Michigan, south to Maryland and Missouri, and on the Pacific slope; Greenland; Europe; Asia; Africa.

EXSIC. Grout, N. Amer. Musci Pleuro. No. 66. Renauld & Cardot, Musci Amer. Sept. No. 243.

REF. Eaton, 15, 66.

Brachythecium rivulare Br. & Sch. *Hypnum rivulare* Bruch.

Wet rocks in brooks, swamps, and ravines. Winter. LITCHFIELD: Salisbury, *Nichols.* HARTFORD: Burlington, *Nichols;* Hartford, *Mrs. Lowe.* TOLLAND: Bolton, *Nichols.* WINDHAM: Windham, *Nichols.* NEW HAVEN: Beacon Falls, *Nichols;* Bethany (1876), *Eaton;* Cheshire, *Nichols;* Hamden, *J. A. Allen;* Woodbridge, *Brewster.*

Northern North America, south to North Carolina and Missouri; Europe; Asia.

EXSIC. Renauld & Cardot, Musci Amer. Sept. No. 244.

REF. Eaton, 15, 66.

Brachythecium acuminatum (Hedw.) Kindb. *Hypnum acuminatum* Beauv.

On roots of trees, decaying logs, and rocks in moist woods. Autumn. LITCHFIELD: Salisbury, *Gilman.* NEW HAVEN: Orange (1889), *Eaton.*

Nova Scotia to Minnesota and Colorado, south to the Gulf States.

Brachythecium plumosum (Sw.) Br. & Sch. *Hypnum plumosum* Sw.

Wet non-calcareous rocks in brooks. Autumn. LITCHFIELD: Salisbury, *Gilman.* TOLLAND: Stafford and Vernon, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley;* Windham, *Nichols.* FAIRFIELD: Darien and Norwalk, *Mrs. Lowe.* NEW HAVEN: Beacon Falls, *Nichols;* Cheshire, *Eaton;* Derby and Hamden, *O. D. Allen;* New Haven (1855), *Eaton;* Orange, *Evans;* Oxford, *Harger;* Woodbridge, *Eaton.* MIDDLESEX:

Killingworth, *Nichols*. New London: Waterford, *C. B. Graves*.

Newfoundland to British Columbia, south in the east to Alabama; Europe; Asia; Hawaiian Islands.

Ref. Eaton, 15, 66. Mrs. Lowe, 57.

Brachythecium populeum (Hedw.) Br. & Sch. *Hypnum populeum* Hedw.

Stones, roots, and trunks of trees, in shaded places, especially in pine woods. Winter. Windham: Canterbury, *Mrs. Hadley*. New Haven: East Haven (1874), *Young;* Hamden, *O. D. Allen;* Madison, *Nichols;* New Haven, *Eaton*.

Var. **rufescens** Br. & Sch. *Hypnum petrophilum* Funck.

On trap rock. New Haven: New Haven (1876), *Pease*. The only American locality for the variety.

Nova Scotia to Ontario, south to North Carolina; British Columbia; Europe; Africa.

Ref. Eaton 15, 66. Grout, 34, 190 (var. *rufescens*).

Brachythecium Starkei (Brid.) Br. & Sch. *Hypnum Starkei* Hedw.

At the base of trees, on rotting stumps and earth, in moist mountainous or hilly woods. Winter. Fairfield: Darien, *Mrs. Lowe*. New Haven: Woodbridge (1877), *O. D. Allen*.

Arctic America, Canada, and the northern United States; Europe.

Brachythecium Novæ-Angliæ (Sull. & Lesq.) Jaeg. & Sauerb. *Hypnum Novæ-Angliæ* Sull. & Lesq.

On the ground in swamps and wet woods. Winter. Litchfield: Salisbury, *Nichols*. Tolland: Bolton and Stafford, *Nichols*. Windham: Canterbury, *Mrs. Hadley*. Fairfield: Danbury, *Nichols;* Darien and Norwalk, *Mrs. Lowe;* Redding, *Evans*. New Haven: Beacon Falls, *Nichols;* East Haven, *Evans;* Hamden, *Pease;* Madison, *Nichols;* New Haven (1855), *Eaton;* North Haven, *Nichols;* Orange, *Evans*. Middlesex: Saybrook, *Eaton*. New London: Ledyard, *Nichols*.

Canada southward to North Carolina and Missouri; Europe; Asia.

Ref. Eaton, **15**, 66.

Brachythecium velutinum (L.) Br. & Sch. *Hypnum velutinum* L.

On earth and rocks, at the base of trees, and on rotting wood. Winter. New Haven: East Haven, *Evans;* Hamden (1875), *Young;* New Haven, *Eaton.*

Canada and the northern United States; Europe; Asia.

Ref. Eaton, **15**, 66.

Cirriphyllum Grout

Stalk smooth	**C. Boscii**
Stalk rough	**C. piliferum**

Cirriphyllum piliferum (Schreb.) Grout. *Hypnum piliferum* Schreb. *Eurynchium piliferum* Br. & Sch.

On the ground and at the base of trees in wet woods and meadows. Fruit rare, autumn. Litchfield: Salisbury, *Nichols.* Hartford: Farmington, *Mrs. Lowe.* New Haven: Woodbridge (1876), *O. D. Allen.*

Newfoundland to Maryland and Ohio; Montana to California; Greenland; Europe; Asia.

Ref. Eaton, **15**, 66.

Cirriphyllum Boscii (Schwaegr.) Grout. *Hypnum Boscii* Schwaegr. *Eurynchium Boscii* Jaeg. & Sauerb.

On rocks or on the ground in moist open woods. Fruit rare, autumn. Litchfield: Salisbury, *Nichols.* Windham: Canterbury, *Mrs. Hadley.* Fairfield: Huntington, *Nichols;* Redding, *Evans;* Sherman, *Nichols.* New Haven: Derby, *O. D. Allen;* East Haven, Hamden, and Madison, *Nichols;* Meriden, *Miss Lorenz;* New Haven (1855), *Eaton;* Orange, *Evans;* Oxford, *Harger.* Middlesex: Killingworth, *Nichols;* Saybrook, *Eaton.* New London: Ledyard, *Nichols;* New London, *C. B. Graves;* Norwich, *Setchell;* Old Lyme, *Eaton.*

Vermont to Florida, westward to Colorado and Arkansas.

Ref. Eaton, **15**, 66. Mrs. Hadley, **41**.

Eurynchium Br. & Sch.

1. Stalk smooth 2
   Stalk rough 4
2. Mosses growing on earth, rocks, or logs in moist woods 3
   Mosses growing on wet rocks in brooks or springs...... **E. rusciforme**
3. Leaves spreading; branches attenuate...........**E. strigosum**
   Leaves appressed-imbricated; branches short, julaceous.. **E. diversifolium**
4. Leaves distinctly papillose; median cells 4-6 times as long as broad ....**E. graminicolor**
   Leaves smooth or only slightly papillose; median cells 6-10 times as long as broad.......................**E. hians**

Eurynchium strigosum (Hoffm.) Br. & Sch. *Hypnum strigosum* Hoffm.

Gravelly soil or rocks, roots and old logs, in open woods. Autumn. TOLLAND: Ellington, *Pease*. WINDHAM: Canterbury, *Mrs. Hadley*. NEW HAVEN: East Haven, *Eaton;* Hamden, *Pease;* New Haven (1855), *Eaton;* Orange, *Nichols;* Oxford, *Harger;* Woodbridge, *Eaton*. MIDDLESEX: Killingworth, *Nichols*.

Arctic America, Canada, and the northern United States; Europe; Asia; Africa.

REF. Eaton, 15, 66.

Eurynchium diversifolium Br. & Sch. *Hypnum diversifolium* Schimp.

Soil and rocks in mountainous woods. Late autumn. FAIRFIELD: Huntington, *Nichols*. NEW HAVEN: East Haven, *Cramer;* Hamden and New Haven (1866), *Eaton*. NEW LONDON: Waterford, *C. B. Graves*.

Ontario and New England to British Columbia, south to Louisiana; Greenland; Europe; Asia.

REF. Eaton, 15, 66.

Eurynchium graminicolor (Brid.) Ren. & Card. *Hypnum Sullivantii* Spruce. *Eurynchium Sullivantii* Jaeg. & Sauerb. *Bryhnia graminicolor* Grout.

On rocks and the ground, rarely on wood, in moist shaded places. Autumn. LITCHFIELD: Canaan and Salisbury, *Nichols.* TOLLAND: Stafford, *Nichols.* NEW HAVEN: Branford and Cheshire (1858), *Eaton;* Derby, *O. D. Allen;* Hamden, *Eaton;* Oxford, *Harger;* Woodbridge, *J. A. Allen.*

New Brunswick to Minnesota, south to Georgia.

EXSIC. Renauld & Cardot, Musci Amer. Sept. No. 196 (as *E. Sullivantii*).

REF. Eaton, **15**, 66. Grout, **35**, 233.

Eurynchium hians (Hedw.) Jaeg. & Sauerb. *Hypnum hians* Hedw.

Moist earth in open woods. Late autumn. LITCHFIELD: Salisbury, *Nichols.* HARTFORD: Burlington and Canton, *Nichols;* Manchester, *Cheney.* TOLLAND: Bolton and Stafford, *Nichols.* WINDHAM: Windham, *Nichols.* NEW HAVEN: Cheshire (1855), *Blackman;* East Haven, *Eaton;* Hamden, *J. A. Allen;* Meriden, *Miss Lorenz;* New Haven, *Eaton;* Woodbridge, *Evans.* MIDDLESEX: Killingworth, *Nichols.*

Nova Scotia to British Columbia, south in the east to Alabama; Europe.

REF. Eaton, **15**, 66.

Eurynchium rusciforme (Neck.) Milde. *Hypnum rusciforme* Neck. *Rhynchostegium rusciforme* Br. & Sch.

Dripping rocks and wet stones in brooks. Autumn. LITCHFIELD: Salisbury, *Gilman.* HARTFORD: Burlington and Granby, *Nichols.* TOLLAND: Stafford and Vernon, *Nichols.* FAIRFIELD: Monroe, *Miss Lorenz;* Redding, *Evans.* NEW HAVEN: Beacon Falls, *Nichols;* Hamden and New Haven (1856), *Eaton;* Orange, *Evans;* Oxford, *Harger;* Woodbridge, *O. D. Allen.* MIDDLESEX: East Haddam, *C. B. Graves;* Killingworth, *Nichols.* NEW LONDON: Ledyard, *Nichols.*

Newfoundland to Ontario, south to Georgia, and on the Pacific slope; Europe; Asia; Africa.

EXSIC. Renauld & Cardot, Musci Amer. Sept. No. 197 (as *Rhynchostegium rusciforme*).

REF. Eaton, **15**, 67.

Rhynchostegium Br. & Sch.

Rhynchostegium serrulatum (Hedw.) Jaeg. & Sauerb. *Hypnum serrulatum* Hedw.

On earth, roots of trees, and logs in the woods. Autumn. LITCHFIELD: New Milford and Salisbury, *Nichols.* HARTFORD: Farmington, *Mrs. Lowe.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Darien, *Mrs. Lowe;* Huntington, *Nichols;* Norwalk, *Mrs. Lowe.* NEW HAVEN: East Haven, Guilford, and Meriden, *Eaton;* Madison, *Nichols;* New Haven (1855), *Eaton;* Orange, *Evans;* Oxford, *Harger.* MIDDLESEX: Chester and Killingworth, *Nichols.* NEW LONDON: Waterford, *C. B. Graves.*

Newfoundland to Wisconsin, south to the Gulf of Mexico; Alaska; British Columbia.

REF. Eaton, 15, 67.

Sematophyllum Mitt.

1. Plants growing on wet rocks; monoicous; leaves entire; cilia one or two, short and imperfect........**S. carolinianum**
Plants growing on trees, decayed logs, or shaded banks; dioicous 2

2. Cilia two, well developed; leaves serrulate at apex........ **S. recurvans**
Cilia none or rudimentary; leaves sharply serrate at apex **S. tenuirostre**

Sematophyllum recurvans (Michx.) E. G. Britton. *Hypnum recurvans* Beauv. *Rhynchostegium recurvans* Aust.

At the base of trees, on rotten logs, and on the ground, in moist woods, especially in mountainous or hilly regions. Autumn. LITCHFIELD: Salisbury, *Gilman.* HARTFORD: Hartford, *Mrs. Lowe.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Danbury, *Nichols.* NEW HAVEN: Beacon Falls, *Nichols;* Hamden (1855), *Eaton;* Oxford, *Harger;* Woodbridge, *Eaton.* MIDDLESEX: Killingworth, *Nichols.*

Var. **squarrosa** (Michx.) E. G. Britton. *Leskea squarrosa* Michx.

NEW HAVEN: New Haven (1890), *Chatterton.*

Newfoundland to Manitoba, south to North Carolina and Missouri; Mexico.

Ref. Mrs. E. G. Britton, 10, 61 (var. *squarrosa*). Eaton, 15, 67.

Sematophyllum tenuirostre (Br. & Sch.) E. G. Britton. *Hypnum cylindrocarpum* C. Müll. *Rhynchostegium cylindrocarpum* Aust.

On rocks and decaying logs in the woods. Autumn. New Haven: Hamden (1878), *J. A. Allen.*

Labrador and Newfoundland, south to Georgia.

Ref. Eaton, 15, 67.

Sematophyllum carolinianum (C. Müll.) E. G. Britton. *Hypnum demissum* Wils. var. *carolinianum* Sull. & Lesq.

Wet, non-calcareous rocks in mountain or hill ravines. Autumn. Litchfield: Salisbury, *Nichols.* Hartford: Hartford, *Mrs. Lowe.* Fairfield: Darien, *Mrs. Lowe.* New Haven: Orange (1875), *Young;* Woodbridge, *J. A. Allen.* Middlesex: Killingworth, *Nichols.*

Newfoundland to the Gulf States; Asia.

Exsic. Grout, N. Amer. Musci Pleuro. No. 307 (as *Raphidostegium carolinianum*).

Isopterygium Mitt.

1. Leaves distinctly serrulate, at least in the apical half...... 2
   Leaves entire, or nearly so.............................. 3
2. Plants monoicous; leaves serrulate to the middle...... **I. turfaceum**
   Plants dioicous; leaves serrulate to the base..**I. deplanatum**
3. Leaves perfectly entire, without axillary propagula; branchlets tending to become flagelliform at the tips **I. Muellerianum**
   Leaves slightly serrulate at apex, and frequently producing numerous leafy propagula in the axils; branchlets never flagelliform ....**I. elegans**

Isopterygium deplanatum (Schimp.) Jaeg. & Sauerb. *Hypnum deplanatum* Schimp. *Rhynchostegium deplanatum* Sull.

On earth, flat stones, or rotten wood in moist woods.

Fruit rare, autumn. TOLLAND: Stafford, *Nichols.* NEW HAVEN: Cheshire, *Evans;* Hamden (1876), *Pease.*

Nova Scotia to Manitoba, south to Maryland and Missouri.

REF. Eaton, 15, 67.

Isopterygium turfaceum Lindb. *Hypnum turfaceum* Lindb.

In peat bogs or on moist rich soil in the woods. Early summer. LITCHFIELD: Salisbury, *Nichols.* NEW HAVEN: East Haven, *Nichols;* Woodbridge (1880), *J. A. Allen.*

Canada south to Georgia and Texas; Europe.

Isopterygium Muellerianum (Schimp.) Lindb. *Hypnum Muellerianum* Hook. f.

Moist rocks and earth in mountainous or hilly ravines. Fruit rare, late summer. LITCHFIELD: Salisbury, *Miss Lorenz.* HARTFORD: Manchester, *Miss Lorenz.* NEW HAVEN: Beacon Falls, *Nichols;* Hamden (1880), *J. A. Allen.* MIDDLESEX: Killingworth, *Nichols.*

New England to North Carolina and Ohio; Europe; Asia.

Isopterygium elegans (Hook.) Lindb. *Hypnum elegans* Hook.

On the ground and rocks in mountainous or hilly woods. Summer. NEW HAVEN: Beacon Falls, *Nichols;* Woodbridge (1879), *J. A. Allen.*

Throughout northern North America, and south along the mountains to Alabama; Europe; Asia.

Plagiothecium Br. & Sch.

1. Leaves equally spreading, alar cells greatly enlarged; branches erect .... **P. striatellum**
   Leaves more or less complanate 2
2. Teeth of peristome not confluent at base and without cross striations on outer surface; cilia lacking...... **P. latebricola**
   Teeth of peristome confluent at base and distinctly transversely striate on outer surface; cilia present.......... 3
3. Monoicous; stems depressed; leaves distinctly complanate, pale green, very glossy.................... **P. denticulatum**
   Dioicous 4

4. Stems depressed; leaves distinctly complanate, acute to acuminate, dark green, scarcely glossy........**P. sylvaticum**
Stems ascending; leaves obscurely complanate or spreading, distinctly acuminate, pale green, glossy...**P. Roeseanum**

Plagiothecium latebricola (Wils.) Br. & Sch. *Hypnum latebricola* Lindb.

Roots, stumps, and hummocks in swamps. Late summer. New Haven: East Haven (1879), *J. A. Allen.*

Nova Scotia to Ontario, south to Alabama; Europe.

Plagiothecium sylvaticum (Huds.) Br. & Sch. *Hypnum sylvaticum* Huds.

On soil, rocks, and decaying logs in the woods. Summer. Litchfield: New Milford, *Nichols;* Salisbury, *Gilman.* Hartford: Hartford, *Miss Lorenz.* Tolland: Stafford, *Nichols.* Windham: Windham, *Nichols.* New Haven: Beacon Falls, *Nichols;* Meriden (1856), *Eaton;* North Haven, *Nichols;* Oxford, *Harger;* Woodbridge, *Eaton.* Middlesex: Durham, *Evans.*

Nova Scotia to Minnesota, south to Alabama; Alaska to Oregon; Europe; Asia; Africa.

Ref. Eaton, 15, 67.

Plagiothecium Roeseanum Br. & Sch. *Hypnum Sullivantiæ* Schimp.

On earth and stones in swampy woods. Summer. Windham: Canterbury, *Mrs. Hadley.* New Haven: East Haven, *J. A. Allen;* New Haven (1876), *Pease.*

Nova Scotia to Alaska and British Columbia, south in the east to Florida; Europe; Asia.

Plagiothecium denticulatum (L.) Br. & Sch. *Hypnum denticulatum* L.

Decayed logs, stones, and humus in moist woods. Summer. Litchfield: Salisbury, *Nichols.* Hartford: Farmington, *Mrs. Lowe;* Southington, *Chamberlain.* Tolland: Ellington, *Pease;* Stafford, *Nichols.* Windham: Canterbury, *Mrs. Hadley;* Windham, *Nichols.* Fairfield: Darien, *Mrs. Lowe.* New Haven: Beacon Falls, *Nichols;* Bethany, *Merriam;*

East Haven, *Eaton;* Hamden, *Pease;* New Haven, *J. A. Allen;* North Haven, *Nichols;* Orange (1874), *Young.* MIDDLESEX: Killingworth, *Nichols.*

Var. **lætum** (Br. & Sch.) Lindb.

TOLLAND: Ellington, *Pease.* NEW HAVEN: New Haven (1876) and Woodbridge, *Eaton.*

Arctic America, Canada, and the northern United States, southward along the mountains; South America; Europe; Asia; Africa; New Zealand; Tasmania.

REF. Eaton, **15**, 67.

Plagiothecium striatellum (Brid.) Lindb. *Hypnum Muhlenbeckii* Spruce. *P. Muhlenbeckii* Br. & Sch.

On earth, non-calcareous rocks, and rotten logs in the woods. Summer. LITCHFIELD: Salisbury, *Gilman.* HARTFORD: East Hartford, *Mrs. Lowe.* TOLLAND: Ellington, *Pease;* Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Darien, *Mrs. Lowe;* Easton, *Eames;* Norwalk, *Mrs. Lowe;* Redding, *Evans;* Stratford, *Eames.* NEW HAVEN: Beacon Falls, *Nichols;* East Haven, *J. A. Allen;* Hamden and New Haven (1866), *Eaton.* MIDDLESEX: Durham, *Evans;* Killingworth, *Nichols;* Saybrook, *Eaton.* NEW LONDON: East Lyme, *C. B. Graves;* Ledyard, *Nichols;* Old Lyme and Waterford, *C. B. Graves.*

Greenland and Newfoundland to Minnesota, south to North Carolina; Alaska; Europe.

REF. Eaton, **15**, 67. Mrs. Lowe, **56**.

Amblystegiella Loeske

Plants minute (0.5-1 cm. long); leaves 0.2-0.4 mm. long.. **A. confervoides**

Plants larger (2-4 cm. long); leaves 0.8-1.2 mm. long.. **A. adnata**

Amblystegiella confervoides (Brid.) Loeske. *Hypnum confervoides* Brid.

Shaded limestone ledges. Summer. LITCHFIELD: Salisbury, *Nichols.* FAIRFIELD: Sherman (1906), *Evans.*

New Brunswick to Connecticut and Ohio, westward to the Rocky Mountains; Europe; Asia.

EXSIC. Grout, N. Amer. Musci Pleuro. No. 317 (as *Amblystegium confervoides*).

Amblystegiella adnata (Hedw.) Nichols. *Hypnum adnatum* Hedw. *Amblystegium adnatum* Aust.

On rocks and at the base of trees in the woods. Autumn. LITCHFIELD: Salisbury, *Nichols.* FAIRFIELD: Danbury, *Nichols;* Darien, *Mrs. Lowe.* NEW HAVEN: East Haven, *Eaton;* Meriden, *Nichols;* New Haven (1875), *Eaton;* Woodbridge, *J. A. Allen.* NEW LONDON: New London, *C. B. Graves.*

New Brunswick to British Columbia, south to North Carolina and Texas; Asia.

REF. Eaton, 15, 67.

Amblystegium Br. & Sch.

1. Leaves with a distinct border, midrib joining border at apex .... **A. Lescurii**
   Leaves not bordered 2
2. Midrib extending nearly or quite to apex 3
   Midrib disappearing at the middle or above 6
3. Leaves not acuminate, apex blunt .... **A. fluviatile**
   Leaves acuminate, apex acute 4
4. Basal cells abruptly enlarged .... **A. irriguum**
   Basal cells not enlarged 5
5. Midrib ceasing below apex, 0.024-0.035 mm. wide at base .. **A. varium**
   Midrib commonly strong, excurrent, 0.065-0.225 mm. wide at base .... **A. noterophilum**
6. Cells near middle of leaf 10-15 times as long as broad .... **A. riparium**
   Cells near middle of leaf 8 times as long as broad, or less .. 7
7. Alar cells quadrate or transversely elongated .... **A. serpens**
   Alar cells oblong 8
8. Stem leaves 0.9-1.2 mm. long .... **A. Juratzkanum**
   Stem leaves 1.2-1.6 mm. long .... **A. Kochii**

Amblystegium serpens (L.) Br. & Sch. *Hypnum serpens* L.

On the roots and at the base of trees, on decaying logs, soil, and rocks in moist woods. Early summer. LITCHFIELD:

Salisbury, *Nichols.* HARTFORD: Hartford, *Mrs. Lowe.* TOLLAND: Ellington, *Pease.* NEW HAVEN: Branford and Hamden, *O. D. Allen;* New Haven (1855), *Eaton;* NEW LONDON: Waterford, *C. B. Graves.*

Arctic America to the Gulf of Mexico: found in most parts of the world.

REF. Eaton, 15, 67.

Amblystegium Juratzkanum Schimp.

Moist stones or earth. Early summer. LITCHFIELD: Salisbury (1905), *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* NEW HAVEN: North Branford, *Evans.*

Temperate North America; Europe; Asia.

Amblystegium varium (Hedw.) Lindb. *Hypnum orthocladon* Brid. *Amblystegium radicale* Br. & Sch. *Hypnum radicale* Wils. *Amblystegium orthocladon* Mac. & Kindb.

On stones, earth, or rotten wood, and at the base of trees in moist woods. Late spring. LITCHFIELD: Salisbury, *Gilman.* HARTFORD: Canton, *Nichols;* Windsor, *W. E. Britton.* TOLLAND: Ellington, *Pease;* Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Darien, *Mrs. Lowe;* Redding, *Evans.* NEW HAVEN: Cheshire, *Nichols;* East Haven, Hamden, and New Haven, *O. D. Allen;* North Branford, *Evans;* Orange (1874), *Kleeberger.* MIDDLESEX: Chester, *Nichols.* NEW LONDON: Groton, *C. B. Graves.*

Southern Canada to the Gulf of Mexico; Europe.

REF. Eaton, 15, 67.

Amblystegium irriguum (Wils.) Br. & Sch. *Hypnum irriguum* Wils.

On earth or stones, not on limestone, in wet places, frequently in the water. Late spring. HARTFORD: Hartford and Windsor, *Mrs. Lowe.*

Ontario southward to North Carolina and Missouri; Europe; Asia; Africa.

REF. Mrs. Lowe, 58.

Amblystegium noterophilum (Sull.) Holzing. *Hypnum irriguum* var. *spinifolium* Lesq. & James.

In or at the margins of springs and streams in calcareous regions. Rarely fruiting; summer. LITCHFIELD: Salisbury, (1907), *Nichols.*

New England to Pennsylvania, westward to Montana and Oregon.

Amblystegium fluviatile (Sw.) Br. & Sch. *Hypnum fluviatile* Sw.

Rocks or earth in and along streams in non-calcareous districts. Early summer. LITCHFIELD: Salisbury, *Nichols.* HARTFORD: Berlin, *Coleman;* Plainville and Southington, *Chamberlain.* TOLLAND: Ellington, *Pease;* Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* NEW HAVEN: Cheshire, *Eaton;* East Haven, *O. D. Allen;* Hamden, *Nichols;* Meriden (1856), *Eaton;* North Branford, *Evans.* MIDDLESEX: Killingworth, *Nichols.*

Newfoundland to Wisconsin, south to New Jersey and Missouri; Europe.

EXSIC. Renauld & Cardot, Musci Amer. Sept. No. 246 (as *A. orthocladon*).

REF. Eaton, 15, 67.

Amblystegium Lescurii (Sull.) Aust. *Hypnum Lescurii* Sull.

Wet rocks in mountain or hill streams. Late spring. TOLLAND: Ellington, *Pease;* Stafford, *Nichols.* NEW HAVEN: Ansonia, *O. D. Allen;* Beacon Falls, *Nichols;* Hamden, *J. A. Allen;* Orange (1874), *Kleeberger.* NEW LONDON: Groton, *C. B. Graves;* Ledyard, *Nichols.*

Ontario and New England, south to Georgia.

Amblystegium riparium (L.) Br. & Sch. *Hypnum riparium* L.

On earth, stones, and roots of trees, in swamps, springs, or running water. Late spring. LITCHFIELD: Litchfield, *Mrs. E. G. Britton;* Salisbury, *Nichols.* HARTFORD: Hartford, *Mrs. Lowe;* Southington, *Nichols.* TOLLAND: Bolton, *Nichols;* Ellington, *Pease.* NEW HAVEN: East Haven, Hamden, and New Haven (1856), *Eaton.* NEW LONDON: Waterford, *C. B. Graves.*

Var. **longifolium** (Schultz) Br. & Sch.

FAIRFIELD: Darien (1903), *Mrs. Lowe.*

Throughout North America, and in most parts of the world.

REF. Eaton, 15, 67.

Amblystegium Kochii Br. & Sch.

On earth in moist woods. Early summer. NEW HAVEN: New Haven (1906), *Nichols.*

Probably throughout temperate North America; Europe; Asia.

Chrysohypnum (Hampe) G. Roth

1. Midrib wanting, or very short and double.............. 2
   Midrib distinct, single.................................. 4
2. Monoicous; plants small (1-4 cm. long); leaves finely serrulate all around..............................**C. hispidulum**
   Dioicous; plants larger (5-10 cm. long); leaves entire..... 3
3. Stems erect or ascending; leaves gradually acuminate.. **C. stellatum**
   Stems procumbent; leaves suddenly ending in a long piliform acumen ....**C. protensum**
4. Leaves squarrose, alar cells scarcely enlarged.......... **C. chrysophyllum**
   Leaves erect, spreading; alar cells enlarged...**C. polygamum**

Chrysohypnum hispidulum (Brid.) G. Roth. *Hypnum hispidulum* Brid.

Roots of trees, decayed wood, and humus, in wet, swampy woods. Summer. LITCHFIELD: Salisbury, *Nichols.* HARTFORD: Farmington, *Mrs. Lowe.* TOLLAND: Ellington, *Pease.* WINDHAM: Canterbury, *Mrs. Hadley.* NEW HAVEN: Cheshire and East Haven, *Eaton;* Hamden, *J. A. Allen;* Madison, *Nichols;* New Haven (1856), *Eaton;* Orange and Oxford, *Harger.* NEW LONDON: New London and Waterford, *C. B. Graves.*

Canada southward to North Carolina and Missouri; Europe; Asia.

REF. Eaton, 15, 67.

Chrysohypnum chrysophyllum (Brid.) Loeske. *Hypnum chrysophyllum* Brid.

Rocks, earth, roots, and stumps, in moist places. Summer.

LITCHFIELD: Salisbury, *Gilman.* HARTFORD: Farmington, *Mrs. Lowe;* West Hartford, *Miss Lorenz.* TOLLAND: Ellington (1876), *Pease;* Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* NEW HAVEN: East Haven, *Eaton;* Hamden, *O. D. Allen;* New Haven, *Pease;* Orange, *O. D. Allen.* MIDDLESEX: Killingworth, *Nichols.*

Var. **tenellum** Schimp. *Hypnum bergenense* Aust.

NEW HAVEN: Ansonia, *O. D. Allen;* New Haven (1881), *J. A. Allen.*

Canada and the northern United States, south to Louisiana; Europe; Asia.

REF. Eaton, 15, 67.

Chrysohypnum protensum (Brid.) Loeske. *Hypnum stellatum* var. *protensum* Röhl.

On hummocks in swamps, and on the ground in wet places. Fruit rare, summer. NEW HAVEN: Branford, *O. D. Allen;* Cheshire, *Nichols;* New Haven (1880), *J. A. Allen.* NEW LONDON: Norwich, *Hatcher.*

Canada and the northern United States; Europe; Asia.

Chrysohypnum stellatum (Schreb.) Loeske. *Hypnum stellatum* Schreb.

Wet banks and swamps. Summer. LITCHFIELD: Salisbury, *Nichols.* HARTFORD: Farmington (1903), *Mrs. Lowe;* West Hartford, *Miss Lorenz.* FAIRFIELD: Danbury, *Nichols.* NEW HAVEN: Meriden, *Miss Lorenz.*

Arctic America, south to Virginia; Europe; Asia.

Chrysohypnum polygamum (Br. & Sch.) Loeske. *Hypnum polygamum* Wils.

Moist sandy places in meadows and swamps. Early summer. WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Stratford, *Eames.* NEW HAVEN: Oxford (1890), *Harger.*

Arctic America, Canada, and the northern United States; Europe; Asia.

Cratoneuron (Sull.) G. Roth

Cratoneuron filicinum (L.) G. Roth. *Hypnum filicinum* L.

On wet limestone rocks, frequently in springs or swamps.

Fruit rare, spring. LITCHFIELD: Salisbury (1905), *Nichols.* FAIRFIELD: Sherman, *Nichols.*

Arctic America, Canada, and the northern United States, south to the mountains of Utah; Europe; Asia; Africa.

Rhytidiadelphus (Lindb.) Warnst.

Stem leaves multiplicate, rough at back.......... **R. triquetrus**
Stem leaves not plicate, smooth at back......... **R. squarrosus**

Rhytidiadelphus triquetrus (L.) Warnst. *Hypnum triquetrum* L. *Hylocomium triquetrum* Br. & Sch.

On the ground in swampy or dry woods. Fruit occasional, early spring. LITCHFIELD: Cornwall, *Brewster;* Salisbury, *Nichols.* HARTFORD: Plainville, *Chamberlain;* West Hartford, *Miss Lorenz.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Sherman, *Nichols.* NEW HAVEN: East Haven (1855), *Eaton;* Hamden, *J. A. Allen;* New Haven, *Eaton;* North Branford, *Evans;* Woodbridge, *Eaton.* NEW LONDON: Griswold, *C. B. Graves.*

Arctic America, Canada, and the northern United States; south in the east to North Carolina; Europe; Asia; Africa.

REF. Eaton, 15, 68.

Rhytidiadelphus squarrosus (L.) Warnst. *Hypnum squarrosum* L.

Meadows and wet grassy places. Fruit rare, spring. NEW HAVEN: Hamden (1880), *J. A. Allen.*

Arctic America, Canada, and the northern United States; Europe; Asia; Azores.

Rhytidium (Sull.) Kindb.

Rhytidium rugosum (Ehrh.) Kindb. *Hypnum rugosum* Ehrh.

In dry grassy places and on sunny rocks, usually calcareous, in mountainous or hilly regions. Fruit very rare, summer. LITCHFIELD: Salisbury, *Mrs. Phelps.* FAIRFIELD: Sherman, *Nichols.* NEW HAVEN: Meriden (1873), *Eaton.*

Arctic America, Canada, and the northern United States; Europe; Asia.

EXSIC. Renauld & Cardot, Musci Amer. Sept. No. 200.
REF. Eaton, 15, 67.

Hylocomium Br. & Sch.

Stem regularly bi-tripinnate; stem leaves gradually acuminate, not auricled .... **H. splendens**
Stem irregularly pinnate; stem leaves abruptly acuminate, auricled at the base........................ **H. brevirostre**

Hylocomium splendens (Hedw.) Br. & Sch. *Hypnum splendens* Hedw.

Moist mountain or hill woods. Fruit occasional, spring. LITCHFIELD: Norfolk, *Eaton;* Salisbury, *Gilman.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Newtown, *Harger;* Redding, *Evans.* NEW HAVEN: New Haven (1855), *Eaton;* North Branford, *Miss Bradley;* Woodbridge, *Evans.* NEW LONDON: Ledyard, *C. B. Graves.*

Arctic America, Canada, and the northern United States; Europe; Asia; Africa.

REF. Eaton, 15, 68.

Hylocomium brevirostre (Ehrh.) Br. & Sch. *Hypnum brevirostre* Ehrh.

On rocks and at the base of trees in wet ravines. Spring. LITCHFIELD: Salisbury, *Gilman.* FAIRFIELD: Monroe, *Miss Lorenz;* Redding, *Evans.* NEW HAVEN: Beacon Falls, *Nichols;* Cheshire and Hamden (1866), *Eaton;* Oxford, *Harger;* Woodbridge, *Eaton.*

Nova Scotia to Ontario, south to North Carolina; Europe; Asia; Africa.

REF. Eaton, 15, 68.

Ctenidium (Schimp.) Mitt.

Ctenidium molluscum (Hedw.) Mitt. *Hypnum molluscum* Hedw.

Moist rocks and earth in mountainous or hilly woods. Fruit occasional, summer. LITCHFIELD: Salisbury, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* NEW HAVEN: East

Haven, *Evans;* Hamden (1855), *Eaton.* Middlesex: Killingworth, *Nichols.*

Newfoundland to Georgia, west to the Rocky Mountains; Europe; Asia; Africa.

Ref. Eaton, 15, 67.

Ptilium (Sull.) DeNot.

Ptilium Crista-castrensis (L.) DeNot. *Hypnum Crista-castrensis* L.

On moist earth and rotten logs in mountainous or hilly woods. Fruit occasional, autumn. Litchfield: Cornwall, *Brewster;* Norfolk, *Eaton;* Salisbury, *Nichols.* Hartford: Hartford, *Mrs. Lowe.* Windham: Canterbury, *Mrs. Hadley.* New Haven: East Haven and Hamden, *Eaton;* Oxford, *Harger;* Woodbridge (1875), *Eaton.* New London: Groton and Montville, *C. B. Graves;* Norwich, *Setchell;* Preston, *C. B. Graves.*

Arctic America, Canada, and the northern United States, south in the east to North Carolina; Europe; Asia.

Ref. Eaton, 15, 68.

Stereodon (Brid.) Mitt.

1. Alar cells more or less enlarged, often inflated, hyaline or colored 2
   Alar cells quadrate, not enlarged 6
2. Capsule plicate when dry; leaves serrulate above 3
   Capsule not plicate when dry 4
3. Alar cells scarcely inflated, yellow, thick-walled .. **S. curvifolius**
   Alar cells inflated, hyaline, thin-walled .... **S. Lindbergii**
4. Capsule suberect; leaves serrulate all around, alar cells orange; paraphyllia numerous .... **S. imponens**
   Capsule cernuous; leaves serrulate only above, alar cells green, hyaline, or yellow-brown; paraphyllia few 5
5. Mosses growing on bark or logs in the woods .... **S. fertilis**
   Mosses growing on the ground in swamps .... **S. pratensis**
6. Quadrate cells numerous; midrib absent or very short .... **S. cupressiformis**
   Quadrate cells few; midrib usually reaching to middle of leaf 7

7. Branch leaves long-acuminate, serrulate to near the base **S. pallescens**
Branch leaves subulate to short-acuminate, serrulate only above the middle .... **S. reptilis**

Stereodon fertilis (Sendt.) Lindb. *Hypnum fertile* Sendt.

Rotten logs and stumps in mountainous or hilly woods. Summer. WINDHAM: Canterbury, *Mrs. Hadley.* NEW HAVEN: Oxford (1888), *Harger.*

Canada and the northern United States, south in the east to Georgia; Europe; Asia.

Stereodon pallescens (Hedw.) Lindb. *Hypnum pallescens* Br. & Sch. *H. Jamesii* Lesq. & James.

On rocks and stumps and at the base of trees in hilly woods. Summer. LITCHFIELD: Salisbury, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* NEW HAVEN: East Haven and Woodbridge (1866), *Eaton.* NEW LONDON: East Lyme, New London, and Waterford, *C. B. Graves.*

Canada and the northern United States, south in the east to North Carolina; Europe; Asia.

REF. Eaton, **15**, 67.

Stereodon reptilis (Michx.) Mitt. *Hypnum reptile* Michx.

On roots, logs, and at the base of trees, especially spruce, in mountainous or hilly woods. Autumn. LITCHFIELD: Salisbury, *Gilman.* HARTFORD: Hartford, *Mrs. Lowe.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Danbury, *Nichols;* Darien, *Mrs. Lowe.* NEW HAVEN: New Haven (1876), *J. A. Allen;* Orange, *O. D. Allen.* MIDDLESEX: Killingworth, *Nichols.*

Canada south to North Carolina and Utah; Europe; Asia.

REF. Eaton, **15**, 67. Mrs. Lowe, **58**.

Stereodon imponens (Hedw.) Lindb. *Hypnum imponens* Hedw.

On stones, earth, roots, and stumps in moist woods. Late autumn. LITCHFIELD: Salisbury, *Gilman.* HARTFORD: Canton, *Nichols;* West Hartford, *Miss Lorenz;* Windsor, *W. E.*

Britton. TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* NEW HAVEN: Beacon Falls, *Nichols;* Hamden, *J. A. Allen;* New Haven (1855), *Eaton;* Woodbridge, *O. D. Allen.*

Canada south to Georgia and California; Europe; Asia.

REF. Eaton, 15, 67.

Stereodon cupressiformis (L.) Lindb. *Hypnum cupressiforme* L.

Rocks, roots, and trunks of trees, in moist woods or wet ravines. Late autumn. LITCHFIELD: Salisbury, *Nichols.* HARTFORD: Canton, *Nichols;* Hartford, *Mrs. Lowe.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley;* Windham, *Nichols.* FAIRFIELD: Danbury, *Nichols;* Redding, *Evans;* Sherman and Stratford, *Nichols.* NEW HAVEN: Derby, *O. D. Allen;* East Haven, Hamden, and New Haven, *Eaton;* Oxford, *Harger.* MIDDLESEX: Chester and Killingworth, *Nichols.* NEW LONDON: New London, *C. B. Graves.*

Arctic America, Canada, and south to the Gulf States; a cosmopolitan.

REF. Eaton, 15, 67.

Stereodon Lindbergii (Mitt.) Warnst. *Hypnum Patientiæ* Lindb.

Moist woods, meadows, and swamps. Summer. LITCHFIELD: Salisbury, *Nichols.* HARTFORD: Canton, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Darien (1903), *Mrs. Lowe.* NEW HAVEN: New Haven, *Nichols.* MIDDLESEX: Killingworth, *Nichols.*

Arctic America, Canada, and the northern United States, south in the east to Florida; Europe; Asia.

EXSIC. Grout, N. Amer. Musci Pleuro. No. 141 (as *H. Patientiæ*).

Stereodon curvifolius (Hedw.) E. G. Britton. *Hypnum curvifolium* Hedw.

On decaying logs, rarely on rocks, in moist woods. Early summer. LITCHFIELD: Salisbury, *Nichols.* TOLLAND: Ellington, *Pease*. WINDHAM: Canterbury, *Mrs. Hadley*. NEW HAVEN: Beacon Falls, *Nichols;* Cheshire (1856), *Eaton;* Hamden and New Haven, *J. A. Allen;* North Branford, *Eaton;* Prospect, *Merriam*. MIDDLESEX: Killingworth, *Nichols*. NEW LONDON: Ledyard, *C. B. Graves*.

Arctic America and Canada, southward to Florida and Colorado; Asia.

REF. Eaton, 15, 67.

Stereodon pratensis (Koch) E. G. Britton. *Hypnum pratense* Koch.

Swampy meadows. Fruit rare, spring. HARTFORD: Windsor, *Miss Lorenz*. WINDHAM: Canterbury, *Mrs. Hadley*. FAIRFIELD: Bridgeport, *Eames*. NEW HAVEN: Hamden (1875), *Young;* New Haven, *O. D. Allen;* Orange, *Evans*.

Arctic America, Canada, and the northern United States, south in the east to Florida; Europe; Asia.

Heterophyllon Kindb.

Heterophyllon Haldanianum (Grev.) Kindb. *Hypnum Haldanianum* Grev.

Rocks, earth, and rotten logs in the woods. Autumn. LITCHFIELD: Salisbury, *Nichols*. HARTFORD: Burlington and Canton, *Nichols;* Hartford, *Miss Lorenz*. TOLLAND: Bolton, *Nichols;* Ellington, *Pease*. WINDHAM: Canterbury, *Mrs. Hadley*. FAIRFIELD: Danbury, *Nichols;* Darien and Norwalk, *Mrs. Lowe*. NEW HAVEN: Bethany, *Eaton;* East Haven, *Nichols;* Hamden, *Eaton;* Madison, *Nichols;* New Haven (1866), *Williams;* North Haven, *Nichols;* Orange, *Chatterton;* Oxford, *Harger;* Woodbridge, *Eaton*. NEW LONDON: New London, *C. B. Graves*.

Nova Scotia to Montana, and south to Alabama and Missouri; Europe; Asia.

EXSIC. Grout, N. Amer. Musci Pleuro. No. 47^a (as *Hypnum Haldanianum*). Renauld & Cardot, Musci Amer. Sept. No. 199 (as *H. Haldanianum*).

REF. Eaton, 15, 68.

Hypnum (Dill.) L.

Hypnum Schreberi Willd.

Dry, open woods, banks, bogs, etc. Fruit occasional, spring. LITCHFIELD: New Milford and Salisbury, *Nichols.* HARTFORD: Canton, *Nichols;* Hartford, *Mrs. Lowe.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Redding, *Evans.* NEW HAVEN: East Haven, *Evans;* Hamden, *Eaton;* Meriden, *Nichols;* New Haven (1866) and Woodbridge, *Eaton.* MIDDLESEX: Killingworth, *Nichols.* NEW LONDON: Groton, *C. B. Graves.*

Arctic America, Canada, and the northern United States; Europe; Asia.

REF. Eaton, **15**, 68.

Calliergon (Sull.) Kindb.

Plants monoicous (autoicous), sparingly branched; alar cells enlarged, but passing gradually into the normal cells of the leaf............................**C. cordifolium**

Plants dioicous, profusely branched; alar cells inflated, forming a sharply defined group..............**C. giganteum**

Calliergon giganteum (Schimp.) Kindb. *Hypnum giganteum* Schimp.

Bogs, swamps, and wet places, especially in calcareous districts. Fruit rare, May-June. LITCHFIELD: Salisbury, *Mrs. Phelps.* FAIRFIELD: Danbury (1907), *Nichols.*

Greenland to Pennsylvania and westward to the Pacific coast; Europe; Asia.

Calliergon cordifolium (Hedw.) Kindb. *Hypnum cordifolium* Hedw.

Swamps, marshes, and margins of pools. Fruit rare, summer. LITCHFIELD: Salisbury, *Phelps.* TOLLAND: Stafford, *Nichols.* WINDHAM: Windham, *Nichols.* NEW HAVEN: Hamden, *Eaton;* New Haven, *Nichols;* North Branford, *J. A. Allen;* Orange (1855), *Eaton;* Woodbridge, *Evans.* MIDDLESEX: Saybrook, *Eaton.*

Arctic America, Canada, and the northern United States; Europe; Asia.

REF. Eaton, **15**, 68.

Acrocladium Mitt.

Acrocladium cuspidatum (L.) Lindb. *Hypnum cuspidatum* L.

Swamps, bogs, and wet meadows. Fruit rare, summer. LITCHFIELD: Salisbury, *Gilman*. HARTFORD: Berlin, *Coleman*. NEW HAVEN: East Haven, *Eaton;* Meriden, *Miss Lorenz;* New Haven and Orange (1855), *Eaton*.

Canada and the northern United States; Europe; Asia; Africa.

REF. Eaton, 15, 68.

Drepanocladus (C. Müll.) G. Roth

1. Stem with a cortical layer of large, hyaline cells........... 2
   Stem lacking a distinct cortical layer..................... 3
2. Leaves distinctly plicate when moist, and usually minutely serrulate; plants monoicous (autoicous).........**D. aduncus**
   Leaves not plicate when moist, entire; plants dioicous.. **D. intermedius**
3. Leaves serrulate, at least near the apex; annulus lacking; plants monoicous (autoicous)...................**D. fluitans**
   Leaves entire; annulus distinct; plants dioicous........... 4
4. Alar cells enlarged and forming a well-defined group which extends from the margin of the leaf to the midrib...... **D. Kneiffii**
   Alar cells enlarged, but not extending more than half-way from the margin to the midrib......................... 5
5. Alar cells hyaline, becoming brown with age, and forming a clearly defined group; midrib 0.05-0.06 mm. wide at base ....**D. subaduncus**
   Alar cells yellowish brown, enlarged, but showing a gradual transition into the normal cells of the leaf; midrib 0.07-0.11 mm. wide at base.............**D. Sendtneri**

Drepanocladus Kneiffii (Schimp.) Warnst. *Hypnum aduncum* var. *Kneiffii* Schimp.

Bogs and swamps, often in the water. Fruit rare, May-June. LITCHFIELD: Salisbury (1907), *Nichols*. FAIRFIELD: Danbury, *Nichols*.

Arctic America, Canada, and the northern United States; Europe; Africa.

Drepanocladus subaduncus Warnst. *Hypnum aduncum* var. *gracilescens* Br. & Sch.

Swamps and wet places, especially in limestone regions. Rarely fruiting, May-June. LITCHFIELD: Salisbury (1907), *Nichols.* FAIRFIELD: Danbury, *Nichols.*

Northern North America; Europe.

Drepanocladus Sendtneri (Schimp.) Warnst. var. **giganteus** (Schimp.) Warnst. *Hypnum Sendtneri* Schimp. *H. hamifolium* Schimp.

Swamps and bogs, in the water. May-June; fruit of the variety unknown. HARTFORD: Southington, *Miss Lorenz.* NEW HAVEN: New Haven (1877), *O. D. Allen.*

Arctic America, Canada, and the northern United States, south in the west to Utah; Europe; Asia.

REF. Eaton, 15, 67. Rau & Hervey, 64, 45.

Drepanocladus intermedius (Lindb.) Warnst. *Hypnum revolvens* Sw. var. *intermedium* Ren.

Deep swamps. Rarely fruiting, May-June. LITCHFIELD: Salisbury (1907), *Nichols.*

Northern North America; Europe.

Drepanocladus aduncus (L.) Warnst. *Hypnum aduncum* L. *H. uncinatum* Hedw.

Bogs, meadows, and swampy woods. Fruit rare, summer. FAIRFIELD: Stratford, *Nichols.* NEW HAVEN: Bethany, *Eaton;* Branford, *O. D. Allen;* Cheshire, *Harger;* East Haven, New Haven (1855), and Orange, *Eaton;* Oxford, *Harger;* Woodbridge, *J. A. Allen.* MIDDLESEX: Durham, *Evans.*

Arctic America, Canada, and the United States, south to North Carolina and Nevada; Europe; Asia.

REF. Eaton, 15, 67.

Drepanocladus fluitans (L.) Warnst. *Hypnum fluitans* L.

Open swamps and bogs, in the water. Summer. LITCHFIELD: Salisbury, *Nichols.* NEW HAVEN: Hamden, *Evans;* New Haven (1893), *Eaton;* Oxford, *Harger.*

Arctic America, Canada, and the northern United States, south in the west to Utah; Europe; Asia; Africa; New Zealand.

Hygrohypnum (Lindb.) Loeske

1. Leaves suborbicular; alar cells yellow; midrib faint, short, furcate ....**H. dilatatum**
   Leaves ovate or ovate-lanceolate........................ 2
2. Dioicous; alar cells hyaline or yellowish; midrib reaching middle of leaf or beyond, simple or furcate; perichætial leaves not plicate ....**H. ochraceum**
   Monoicous; alar cells golden yellow to yellow-brown, rarely hyaline; perichætial leaves plicate................ 3
3. Midrib absent, or short and furcate...................... 4
   Midrib single, reaching above middle of leaf......**H. palustre**
4. Leaves broad (2:1), minutely serrulate to the base........ **H. Mackayi**
   Leaves narrower (3:1), serrulate only at the apex.. ...... **H. eugyrium**

Hygrohypnum palustre (Huds.) Loeske. *Hypnum palustre* Huds.

Wet and periodically overflowed stones and rocks, usually calcareous. Summer. NEW LONDON: Montville (1894), *C. B. Graves.*

Canada and the northern United States; Europe; Asia.

Hygrohypnum dilatatum (Wils.) Loeske. *Hypnum molle* of some authors.

On non-calcareous rocks and stones in rapid mountain or hill brooks. Summer. LITCHFIELD: Salisbury, *Nichols.* FAIRFIELD: Darien, *Mrs. Lowe.* NEW HAVEN: Ansonia (1880) and Woodbridge, *O. D. Allen.*

Arctic America and Canada, south to North Carolina and Colorado; Europe; Asia.

Hygrohypnum eugyrium (Br. & Sch.) Loeske. *Hypnum eugyrium* Schimp.

On wet non-calcareous rocks in or near mountain or hill brooks. Summer. LITCHFIELD: Salisbury, *Gilman.* NEW HAVEN: Beacon Falls, *Nichols;* Hamden (1878) and Woodbridge, *J. A. Allen.*

Newfoundland to Alaska, south to Georgia and Colorado; Europe.

Hygrohypnum Mackayi (Schimp.) Loeske.

Shaded stones in hill streams. Summer. NEW HAVEN: Beacon Falls (1907), *Nichols.*

Probably has same range as *H. eugyrium.*

Hygrohypnum ochraceum (Turn.) Loeske. *Hypnum ochraceum* Turn.

On overflowed and wet rocks in rapid mountain or hill streams. Fruit rare, summer. LITCHFIELD: Salisbury, *Evans.* NEW HAVEN: Ansonia, *O. D. Allen;* Beacon Falls, *Nichols;* Hamden (1878), *J. A. Allen.*

Arctic America, Canada, and the northern United States; Europe; Asia.

FAMILY DENDROIDACEÆ

Climacium Web. f. & Mohr

Climacium americanum Brid.

Swamps and wet woods. Autumn. LITCHFIELD: Salisbury, *Nichols.* HARTFORD: Hartford, *Miss Lorenz.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Danbury, *Nichols;* Darien, *Mrs. Lowe;* Fairfield, *Eames.* NEW HAVEN: Bethany, *Eaton;* East Haven, *Nichols;* Hamden, *Eaton;* Madison, *Nichols;* Milford and New Haven (1855), *Eaton;* Orange, *Evans;* Woodbridge, *Eaton.* MIDDLESEX: Killingworth, *Nichols;* Middlefield, *Evans.* NEW LONDON: New London, *C. B. Graves.*

Var. **Kindbergii** Ren. & Card. *Climacium Kindbergii* Grout.

In wetter places than the typical form, frequently in the water. TOLLAND: Willington, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Darien, *Mrs. Lowe;* Stratford, *Nichols.* NEW HAVEN: East Haven, *Nichols;* Woodbridge, *Eaton.* MIDDLESEX: Killingworth and Old Lyme, *Nichols.* NEW LONDON: Groton, Montville, and Waterford (1884), *C. B. Graves.*

New Brunswick to Alabama, west to the Rocky Mountains.

EXSIC. Renauld & Cardot, Musci Amer. Sept. No. 238 (var. *Kindbergii*).

REF. Eaton, **15**, 66. Grout, **34**, 161 (var. *Kindbergii*). Young, **81**, 62.

Thamnium Br. & Sch.

Thamnium alleghaniense (C. Müll.) Br. & Sch. *Hypnum alleghaniense* C. Müll.

Dripping overhanging rocks along mountain and hill streams. Autumn. LITCHFIELD: Salisbury, *Nichols*. HARTFORD: West Hartford, *Miss Lorenz*. NEW HAVEN: Cheshire (1856), *Eaton;* Derby, *O. D. Allen;* Hamden, *Eaton;* New Haven, *J. A. Allen;* Oxford, *Harger;* Woodbridge, *Eaton*. NEW LONDON: Montville and Waterford, *C. B. Graves*.

Nova Scotia to Minnesota, south to the Gulf States.

REF. Eaton, **15**, 67.

FAMILY WEBERACEÆ

Webera Ehrh.

Webera sessilis (Schmid.) Lindb. *Diphyscium foliosum* Mohr.

Moist, shaded earth and banks. Summer. LITCHFIELD: New Milford, *Nichols;* Salisbury, *Gilman*. HARTFORD: Hartford, *Mrs. Lowe;* Southington, *Chamberlain;* West Hartford, *Miss Lorenz*. TOLLAND: Bolton, *Nichols*. WINDHAM: Canterbury, *Mrs. Hadley;* Windham, *Nichols*. FAIRFIELD: Danbury and Huntington, *Nichols;* Redding, *Evans*. NEW HAVEN: Ansonia, *O. D. Allen;* Beacon Falls, *Nichols;* Meriden, *Nichols;* New Haven (1855), Orange, and Woodbridge, *Eaton*. MIDDLESEX: Killingworth, *Nichols*. NEW LONDON: Montville, *C. B. Graves*.

Nova Scotia to Ontario, south to Alabama; Europe; Asia; Madeira Islands.

EXSIC. Holzinger, Musci Acro. Bor.-Amer. No. 121^a (as *Diphyscium foliosum*).

REF. Collins, **14**, 131. Eaton, **15**, 64.

FAMILY BUXBAUMIACEÆ

Buxbaumia Haller

Buxbaumia aphylla L.

Clayey banks and turfy soil in open woods. Spring. LITCHFIELD: Salisbury, *Evans*. HARTFORD: Canton, *Nichols;* Manchester, *Miss Lorenz*. FAIRFIELD: Darien, *Mrs. Lowe*. NEW HAVEN: Beacon Falls, *Nichols;* Hamden (1866), *Williams;* New Haven, *J. A. Allen;* Oxford, *Harger;* Woodbridge, *Nichols*.

Nova Scotia to Ontario and West Virginia; Yukon Territory to Washington; Europe; Asia.

EXSIC. Holzinger, Musci Acro. Bor.-Amer. No. 250.

REF. Collins, 14, 131. Eaton, 15, 64; 17, 126.

FAMILY GEORGIACEÆ

Georgia Ehrh.

Georgia pellucida (L.) Rabenh. *Tetraphis pellucida* Hedw.

Rotten stumps, roots, and banks in the woods. Spring. LITCHFIELD: Litchfield, *Harris;* Salisbury, *Gilman*. HARTFORD: Hartford and Manchester, *Miss Lorenz;* Windsor, *W. E. Britton*. TOLLAND: Bolton and Stafford, *Nichols*. WINDHAM: Canterbury, *Mrs. Hadley*. FAIRFIELD: Darien, *Mrs. Lowe;* Redding, *Evans*. NEW HAVEN: Beacon Falls, *Nichols;* Hamden, *Evans;* New Haven (1866), *Eaton;* North Branford, *Evans;* North Haven, *Nichols;* Orange and Woodbridge, *Eaton*. NEW LONDON: East Lyme and Groton, *C. B. Graves*.

Canada and the northern United States; Europe; Asia.

REF. Collins, 14, 131. Eaton, 15, 63.

FAMILY POLYTRICHACEÆ

Catharinæa Ehrh.

1. Leaf cells distinctly papillose.................. **C. Macmillani**
   Leaf cells smooth, not papillose.......................... 2
2. Leaves strongly undulate, serrate nearly to base; capsules borne singly or in small clusters................ **C. undulata**
   Leaves scarcely, if at all, undulate, serrate only above middle; capsules borne singly.......................... 3

3. Plants rarely 5 cm. high; midrib and lamina sharply toothed at back, lamellæ 4-8 .... **C. angustata**
Sterile plants 5-10 cm. high; midrib and lamina smooth at back; lamellæ 1-4 .... **C. crispa**

Catharinæa undulata (L.) Web. f. & Mohr. *Atrichum undulatum* Beauv.

Moist, sandy soil in open woods. Autumn. LITCHFIELD: Salisbury, *Nichols*. HARTFORD: Burlington, *Nichols;* West Hartford, *Miss Lorenz*. TOLLAND: Stafford, *Nichols*. WINDHAM: Canterbury, *Mrs. Lowe;* Windham, *Nichols*. FAIRFIELD: Darien, *Mrs. Lowe*. NEW HAVEN: Beacon Falls, *Nichols;* Hamden, *Eaton;* Madison, *Nichols;* New Haven (1855), *Eaton;* North Haven, *Nichols;* Orange, *Evans;* Woodbridge, *O. D. Allen*. MIDDLESEX: Killingworth, *Nichols*. NEW LONDON: Ledyard, *Nichols;* Montville and Waterford, *C. B. Graves*.

Throughout temperate North America; Europe; Asia; Africa.

REF. Collins, 14, 131. Eaton, 15, 64. Miss Lorenz, 53, 46, 47.

Catharinæa Macmillani Holzing.

In dry, exposed situations. Autumn. HARTFORD: Burlington, *Nichols*. WINDHAM: Canterbury, *Mrs. Hadley*. NEW HAVEN: New Haven, North Haven (1907), and Orange, *Nichols*. NEW LONDON: Ledyard, *Nichols*.

New England to Minnesota and Missouri; range not definitely known.

REF. Chamberlain, 13, 100.

Catharinæa crispa James. *Atrichum crispum* James.

Grassy banks of streams, and in wet sandy soil. Autumn. HARTFORD: East Hartford, *Weatherby*.

Probably throughout Canada and the northern United States; Europe.

REF. Miss Lorenz, 53, 46, 47.

Catharinæa angustata Brid. *Atrichum angustatum* Br. & Sch.

Clayey banks and sandy soil in open woods. Autumn.

LITCHFIELD: Salisbury, *Nichols.* HARTFORD: Canton, *Nichols;* Southington, *Chamberlain;* West Hartford, *Miss Lorenz.* TOLLAND: Bolton and Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Danbury, *Nichols;* Darien, *Mrs. Lowe;* Huntington and Sherman, *Nichols.* NEW HAVEN: East Haven (1855), *Eaton;* Hamden, *Harger;* Madison, *Nichols;* New Haven, *Eaton;* Orange, *Evans;* Woodbridge, *Eaton.* NEW LONDON: North Stonington and Waterford, *C. B. Graves.*

Throughout temperate North America; Europe; Asia.

REF. Collins, 14, 131. Eaton, 15, 64. Miss Lorenz, 53, 46, 47.

Pogonatum Beauv.

Pogonatum tenue (Menz.) E. G. Britton. *P. brevicaule* (Brid.) Beauv. *P. pennsylvanicum* (Hedw.) Par.

Clay banks and roadsides in open woods. Autumn. LITCHFIELD: Salisbury, *Mrs. Phelps.* HARTFORD: Canton, *Nichols;* Hartford, *Mrs. Lowe;* West Hartford, *Miss Lorenz.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Danbury, *Nichols;* Darien, *Mrs. Lowe.* NEW HAVEN: Beacon Falls and Cheshire, *Nichols;* Hamden, *J. A. Allen;* New Haven (1866), and Orange, *Eaton;* Oxford, *Harger;* Woodbridge, *Eaton.* MIDDLESEX: Killingworth, *Nichols.* NEW LONDON: Ledyard, *Nichols;* Waterford, *C. B. Graves.*

Nova Scotia to Alabama, and west to Missouri.

EXSIC. Holzinger, Musci Acro. Bor.-Amer. No. 123 (as *P. pennsylvanicum*).

REF. Collins, 14, 131. Eaton, 15, 64. Mrs. Lowe, 59.

Polytrichum (Dill.) L.

1. Epidermis of capsule with a large pit in the outer wall of each cell, neck distinctly marked off by a constriction; capsule little longer than broad.............. 3
   Epidermis of capsule not pitted, neck indistinctly defined; capsule much longer than broad...................... 2
2. Capsule cylindrical ....**P. alpinum**
   Capsule prismatic ....**P. ohioense**

3. Leaves awned, margins entire, inflexed.................. 4
Leaves pointed, margins sharply serrate, not inflexed..... **P. commune**
4. Awn long and hyaline..........................**P. piliferum**
Awn short and red, rarely colorless at the point........... 5
5. Stem densely tomentose, leaves erect..............**P. strictum**
Stem not tomentose, leaves spreading..........**P. juniperinum**

Polytrichum alpinum L. var. **arcticum** (Sw.) Wahl. *Pogonatum alpinum* Röhl. var. *arcticum* Brid.

Stony and grassy mountain slopes. Summer. LITCHFIELD: Salisbury (1906), *Collins.*

Throughout northern North America; Europe.

Polytrichum ohioense Ren. & Card. *P. formosum* of some authors.

On the ground and on earth-covered rocks in moist woods. Summer. LITCHFIELD: Salisbury, *Gilman.* HARTFORD: Hartford, *Miss Lorenz;* Plainville, *Chamberlain;* Windsor, *Rorer.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Danbury, *Eaton;* Darien, *Mrs. Lowe.* NEW HAVEN: East Haven (1856), *Eaton;* Madison, *Nichols;* New Haven, *J. A. Allen;* North Haven and Orange, *Nichols.* MIDDLESEX: Chester, *Nichols;* Durham, *Evans;* Killingworth, *Nichols.* NEW LONDON: Griswold, *Harger;* Montville and New London, *C. B. Graves;* Waterford, *Miss Lorenz.*

Newfoundland to Alaska, south to Alabama, Missouri, and Oregon; Europe.

EXSIC. Holzinger, Musci Acro. Bor.-Amer. No. 124.

REF. Collins, 14, 131. Eaton, 15, 64.

Polytrichum piliferum Schreb.

Rocky ridges and gravelly banks in hilly regions. Summer. LITCHFIELD: New Milford and Salisbury, *Nichols.* HARTFORD: Hartford, *Miss Lorenz;* Plainville, *Chamberlain.* TOLLAND: Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Darien, *Mrs. Lowe;* Huntington, *Nichols.* NEW HAVEN: Beacon Falls, Madison, and Meriden, *Nichols;* New Haven (1854), *Eaton;* Woodbridge, *Harger.* MIDDLESEX: Killingworth, *Nichols.* NEW LONDON: Ledyard, *Nichols;* Lyme, *Eaton;* Old Lyme, *C. B. Graves.*

Northern North America and southward to Alabama and California; found in most quarters of the globe.

REF. Collins, 14, 131. Eaton, 15, 64.

Polytrichum juniperinum Willd.

In dry pastures or open woods in mountainous or hilly regions. Summer. LITCHFIELD: Salisbury, *Gilman.* HARTFORD: Hartford, *Miss Lorenz;* Southington, *Chamberlain.* TOLLAND: Bolton and Ellington, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley.* FAIRFIELD: Danbury, *Nichols;* Darien, *Mrs. Lowe;* Huntington, *Nichols.* NEW HAVEN: Branford, *Ward;* Hamden, *J. A. Allen;* New Haven (1865), *Eaton.* MIDDLESEX: Killingworth, *Nichols.*

Arctic and temperate North America; a cosmopolitan.

REF. Collins, 14, 131. Eaton, 15, 64.

Polytrichum strictum Banks.

In peat bogs and wet woods. Summer. NEW HAVEN: Orange (1874), *Young.*

Arctic America, Canada, and the northern United States; South America; Europe; Asia.

REF. Collins, 14, 131. Eaton, 15, 64.

Polytrichum commune L.

In pastures and clearings and along the borders of woods and roadsides. Summer. LITCHFIELD: New Milford and Salisbury, *Nichols.* HARTFORD: Hartford, *Miss Lorenz;* Windsor, *Rorer.* TOLLAND: Bolton and Stafford, *Nichols.* WINDHAM: Canterbury, *Mrs. Hadley;* Windham, *Nichols.* FAIRFIELD: Darien, *Mrs. Lowe;* Huntington, Sherman, and Stratford, *Nichols.* NEW HAVEN: Beacon Falls, *Nichols;* Hamden, *Eaton;* Meriden, *Nichols;* New Haven (1856) and Orange, *Eaton;* Oxford, *Harger.* MIDDLESEX: Killingworth, *Nichols.* NEW LONDON: Ledyard, *Nichols;* New London and Waterford, *C. B. Graves.*

Throughout North America; a cosmopolitan.

EXSIC. Renauld & Cardot, Musci Amer. Sept. No. 227.

REF. Collins, 14, 131. Eaton, 15, 64.

SUMMARY

An analysis of the bryophytic flora of Connecticut brings out the interesting fact that only about 18 per cent. of the species are peculiar to America. Over 62 per cent., on the other hand, are common to Europe and Asia, a proportion which is sure to be increased when the Asiatic flora has been more thoroughly explored. Of the remaining species 16 per cent. have been found in Europe but not in Asia, while 4 per cent. have been found in Asia but not in Europe. These relationships may be clearly shown by the following table, in which the species are arranged by orders. One species of Sphagnum which is common to Africa (but not to either Europe or Asia), is included in the first column.

	Peculiar to America.	Common to Europe and Asia.	Common to Europe (but not to Asia).	Common to Asia (but not to Europe).	Total.
Marchantiales . . .	3	9	0	0	12
Jungermanniales . .	17	62	12	1	92
Anthocerotales . .	0	1	2	0	3
Sphagnales . . .	[illegible]	17	12	0	31
Andreæales . . .	0	1	1	0	2
Bryales	46	154	34	13	247
Total	68	244	61	14	387

The table shows also that about 3 per cent. of our species are Marchantiales, about 23 per cent. Jungermanniales, less than 1 per cent. Anthocerotales, about 8 per cent. Sphagnales, less than 1 per cent. Andreæales, and about 64 per cent. Bryales.

The following table, based on the specimens at hand, gives some idea of the extent to which Connecticut has been explored for Bryophytes. Such a table is merely of historical interest. The discrepancies which apparently exist between the moss floras of the different counties are largely of a temporary nature, and will become less as the exploration of the state proceeds. There is little probability, for example, that New Haven County is richer in Bryophytes than New London County. It simply represents the part of the state where bryologists have been most numerous and active.

	Litchfield.	Hartford.	Tolland.	Windham.	Fairfield.	New Haven.	Middlesex.	New London.	Common to the eight counties.
Marchantiales .	8	9	4	3	8	12	6	[illegible]	1
Jungermanniales .	58	32	31	22	38	81	35	12	4
Anthocerotales .	3	0	0	1	0	3	3	2	0
Sphagnales . .	16	2	9	4	3	25	2	5	0
Andreæales . .	1	1	0	0	0	2	0	0	0
Bryales . . .	157	112	98	108	111	223	90	91	31
Total . .	243	156	142	138	160	346	136	112	36

The last column shows the comparatively small number of species known from each county of the state. All of these species are exceedingly common, and the present figures will probably be soon increased by the addition of other species which must be equally common. Even the majority of the species which are known at present from only one or two localities in the state are undoubtedly much more widely distributed than these scanty records would seem to indicate.

BIBLIOGRAPHY OF CONNECTICUT BRYOLOGY

The books and papers included in the following bibliography all contain direct references to Connecticut Bryophytes. Although it has been attempted to make the list as complete as possible, some references have doubtless been overlooked. Papers published since December, 1907, are not included:

1. **Andrews, A. LeR.** Preliminary Lists of New England Plants, — XVIII, Sphagnaceæ. Rhodora, **8**: 62-65. 1906.
2. **Austin, C. F.** Hepaticæ Boreali-Americanæ exsiccatæ. Nos. 1-150. 1872.
3. — Bryological Notes. Bull. Torrey Club, **6**: 341-344. 1879.
4. — Bryological Notes. Bull. Torrey Club, **7**: 15, 16. 1880.
5. **Barbour, W. C.** Frullania. Bryologist, **5**: 3-5. *f. 1-5.* 1902.
6. — Porella L. Sp. Pl. 2: 1196. 1753. Bryologist, **5**: 32-36. *f. 1-8.* 1902.
7. — Hepatics, — Lejeunea. Bryologist, **6**: 27-32. *f. 1-6.* 1903.
8. **Britton, E. G.** Distribution of the eastern species of Mnium. Bryologist, **3**: 4-6. 1900.
9. — Octodiceras Julianum, its Propagation, Distribution and History. Bryologist, **5**: 83, 84. 1 f. 1902.
10. — Further Notes on Sematophyllum. Bryologist, **7**: 59-61. 1904.
11. **Cardot, J.** Répertoire Sphagnologique. Catalogue alphabétique de toutes les espèces et variétés du genre Sphagnum, avec la synonymie, la bibliographie et la distribution géographique d'après les travaux les plus récents. Bull. Soc. d'hist. nat. d'Autun, **10**: 235-433. 1897.

   — See also **Renauld, F.**
12. **Chamberlain, E. B.** Notes upon two Maryland Bryophytes and on two Mosses from Virginia. Bryologist, **8**: 77-78. 1905.
13. — Catharinea Macmillani. Rhodora, **9**: 98-100. *pl. 74.* 1907.
14. **Collins, J. F.** Preliminary Lists of New England Plants, — XIX. Rhodora, **8**: 131-135. 1906.

Cook, O. F. See **Underwood, L. M.**

15. **Eaton, D. C.** Anogens. In "A Catalogue of the Flowering Plants and Higher Cryptogams growing without cultivation within thirty miles of Yale College." Published by the Berzelius Society. Pp. 61-72. New Haven, 1878.
16. — Conomitrium Julianum. Bull. Torrey Club, **6**: 244. 1878.
17. — On Buxbaumia indusiata Bridel. Bull. Torrey Club, **17**: 126, 127. 1890.
18. — A Check-List of North American Sphagna, arranged mostly in accordance with the writings of Dr. Carl Warnstorf. 8vo. 8 pp. New Haven, 1893.
19. **Eaton, D. C., and Faxon, E.** Sphagna Boreali-Americana Exsiccata, curaverunt D. C. Eaton et E. Faxon, distribuit G. F. Eaton. Nos. 1-172. New Haven, 1896.
20. **Evans, A. W.** Two new American Hepaticæ. Bull. Torrey Club, **20**: 307-309. *pl. 162, 163.* 1893.
21. — Notes on the North American species of Plagiochila. Bot. Gazette **21**: 185-194. *pl. 15, 16.* 1896.
22. — A Revision of the North American Species of Frullania, a Genus of Hepaticæ. Trans. Conn. Acad., **10**: 1-39. *pl. 1-15.* 1897.
23. — Studies among our common Hepaticæ. II. Lophocolea heterophylla. Plant World, **1**: 134-137. *pl. 6.* 1898.
24. — Fossombronia salina in Connecticut. Rhodora, **3**: 7-10. 1 f. 1901.
25. — The Lejeuneæ of the United States and Canada. Mem. Torrey Club, **8**: 113-183. *pl. 16-22.* 1902.
26. — Notes on New England Hepaticæ. Rhodora, **4**: 207-213. 1902.
27. — A New Hepatic from the Eastern United States. Bot. Gazette, **34**: 372-375. *pl. 12.* 1902.
28. — Preliminary Lists of New England Plants, — XI, Hepaticæ. Rhodora, **5**: 170-173. 1903.
29. — Odontoschisma Macounii and its North American Allies. Bot. Gazette, **36**: 321-348. *pl. 18-20.* 1903.
30. — Notes on New England Hepaticæ, — II. Rhodora, **6**: 165-174; 185-191. *pl. 57.* 1904.
31. — Notes on New England Hepaticæ, — III. Rhodora, **7**: 52-58. 1905.
32. — Notes on New England Hepaticæ, — IV. Rhodora, **8**: 34-45. 1906.
33. — Notes on New England Hepaticæ, — V. Rhodora, **9**: 56-60; 65-73. *pl. 73.* 1907.

Faxon, E. See **Eaton, D. C.**

34. **Grout, A. J.** A Revision of the North American Isotheciaceæ. Mem. Torrey Club, 6: 131-210. 1897.

35. — A Revision of the North American Eurynchia. Bull. Torrey Club, 25: 221-256. 1898.

36. — North American Musci Pleurocarpi. Nos. 1-300 (exsiccati). 1900-1907. To be continued.

37. — Mosses with a Hand-Lens and Microscope: a non-technical handbook of the more common Mosses of the northeastern United States. Large 8vo. Part I, 86 pp., 10 pl., 35 f. in text. 1903. Part II, pp. 87-166, pl. 11-35, f. in text 36-76. 1904. Part III, pp. 167-246, pl. 36-55, f. in text 77-133. 1906. New York. To be completed in five parts.

38. — Mosses with a Hand-Lens: a non-technical handbook of the more common and more easily recognized Mosses of the northeastern United States. Second Edition. Revised, enlarged, and including the Hepatics. 8vo. pp. xvi + 208. 39 pl. 151 f. in text. New York, 1905.

39. — "When Doctors Disagree." Bryologist, 9: 42. 1906.

40. **Hadley, S. B.** [Offerings to Chapter Members.] Bryologist, 6: 70. 1903.

41. — [Offerings.] Bryologist, 6: 106. 1903.

42. — [Offerings.] Bryologist, 7: 52. 1904.

43. — [Offerings.] Bryologist, 8: 92. 1905.

44. **Haynes, C. C.** Ten Lophozias. Bryologist, 9: 99, 100. *pl. 9.* 1906; 10: 9-12. *pl. 2, 3.* 1907.

45. — American Hepaticæ. Nos. 1-40 (exsiccatæ). New York, 1907-1908. To be continued.

Hervey, A. B. See **Rau, E. A.**

46. **Holzinger, J. M.** Musci Acrocarpi Boreali-Americani. Nos. 1-250 (exsiccati). 1904-1907. To be continued.

47. **Howe, M. A.** The North American Species of Porella. Bull. Torrey Club, 24: 512-527. 1897.

48. — The Anthocerotaceæ of North America. Bull. Torrey Club, 25: 1-24. *pl. 321-326.* 1898.

49. — Notes on American Hepaticæ. Bull. Torrey Club, 29: 281-289. 1902.

50. **Lesquereux, L., and James, T. P.** Manual of the Mosses of North America. 8vo. pp. v + 447. 6 pl. Boston, 1884.

51. **Limpricht, K. G.** Die Laubmoose Deutschlands, Oesterreichs und der Schweiz. 8vo. Band I, x + 836 pp., 211 f. in text. 1890. Band II, 853 pp., f. in text 212-352. 1895. Band III, 864 + 79 pp., f. in text 353-440. 1904. Leipzig. The work

represents Band IV of Rabenhorst's Kryptogamen-Flora, second edition.

52. **Lorenz, A.** [Offerings.] Bryologist, **9**: 53. 1906.

53. —Catharinea in Hartford County. Bryologist, **10**: 45-47. 1907.

54. **Lowe, J. D.** [Offerings to Chapter Members.] Bryologist, **6**: 70. 1903.

55. —[Offerings.] Bryologist, **6**: 90. 1903.

56. —Anacamptodon splachnoides. Bryologist, **7**: 77. 1904.

57. —[Offerings.] Bryologist, **7**: 82. 1904.

58. —[Offerings.] Bryologist, **7**: 100. 1904.

59. —[Offerings.] Bryologist, **8**: 35. 1905.

60. **Müller, C.** Monographie der Lebermoosgattung Scapania Dum. Nova Acta Acad. Caes. Leop.-Carol., **83**: 1-312. *pl. 1-52.* 1905.

61. **Paris, E. G.** Index Bryologicus sive Enumeratio Muscorum hucusque cognitorum adjunctis Synonymia Distributioneque geographica locupletissimis. Act. Soc. Linn. Burdigalensis. Pars I, pp. vi + 964. 1894-1896. Pars II, pp. 965-1380. 1898.

62. —Index Bryologicus sive Enumeratio Muscorum ad diem ultimam anni 1900 hucusque cognitorum adjunctis Synonymia Distributioneque geographica locupletissimis. Editio secunda. 8vo. Paris. Pars I, 384 pp. 1903-1904. Pars II, 375 pp. 1904. Pars III, 400 pp. 1904-1905. Pars IV, 368 pp. 1905. Pars V, 160 pp. 1906.

63. **Rau, E. A.** Review of Lesquereux and James: Manual of the Mosses of North America. Bot. Gazette, **9**: 151, 152. 1884.

64. **Rau, E. A., and Hervey, A. B.** Catalogue of North American Musci. 8vo. 52 pp. Taunton, 1880.

65. **Renauld, F., and Cardot, J.** Musci Americæ Septentrionalis, ex operibus novissimis recensiti et methodice dispositi. Rev. Bryol., **19**: 65-96. 1892; **20**: 1-32. 1893.

66. —Musci Americæ Septentrionalis Exsiccati. Nos. 1-400. 1892-1908.

67. **Stephani, F.** Species Hepaticarum. Vol. I. Anacrogynæ. 413 pp. 1898-1900. Vol. II. Acrogynæ. 615 pp. 1901-1906. Vol. III in course of publication. Reprinted from the Bulletin and Memoirs of the Herbier Boissier.

68. **Sullivant, W. S.** Anophytes. In A. Gray: Manual of the Botany of the Northern United States, 607-702; 733-737. *pl. 1-8.* 1856. Ed. II.

69. — The Musci and Hepaticæ of the United States East of the Mississippi River. 8vo. 113 pp. 8 pl. New York, 1856. Reprint of the above.

70. — Icones Muscorum, or Figures and Descriptions of most of those Mosses peculiar to eastern North America which have not been heretofore figured. 8vo. 216 pp. 128 pl. Cambridge and London, 1864.

71. **Underwood, L. M.** Descriptive Catalogue of the North American Hepaticæ, North of Mexico. Bull. Illinois State Lab. Nat. Hist., **2**: 1-133. 1884.

72. — Hepaticæ. In A. Gray: Manual of the Botany of the Northern United States, 702-732. pl. 22-25. 1890. Ed. VI.

73. — A Few Additions to the Hepatic Flora of the Manual Region. Bull. Torrey Club, **9**: 299-301. 1892.

74. — Notes on our Hepaticæ. II. The Genus Riccia. Bot. Gazette, **19**: 273-278. 1894.

75. — Notes on our Hepaticæ. III. The Distribution of the North American Marchantiaceæ. Bot. Gazette, **20**: 59-71. 1895.

76. — Hepaticæ. Systematic Botany of North America, **9**^{8}: 1-7. 1895.

77. **Underwood, L. M., and Cook, O. F.** Hepaticæ Americanæ. Nos. 1-200 (exsiccatæ). 1887-1899.

78. **Warnstorf, C.** Einige neue exotische Sphagna. Hedwigia, **31**: 174-182. *pl. 26, 27.* 1892.

79. — Europaeische Torfmoose. Serie IV. Nos. 301-400 (exsiccata). 1894.

80. **Wheeler, H.** Note on Claopodium pellucinerve (Mitt.) Best. Bryologist, **6**: 39. 1903.

81. **Young, A. H.** Bryological Notes. Bot. Gazette, **2**: 61, 62. 1876.

INDEX TO CATALOGUE

A

PAGE

Acaulon C. Müll. 88, 108
  muticum (Schreb.) C. Müll. 108
ACROCARPI 87
Acrocladium Mitt. 94, 167
  cuspidatum (L.) Lindb. 167
Amblystegiella Loeske 95, 154
  adnata (Hedw.) Nichols 154, 155
  confervoides (Brid.) Loeske 154
Amblystegium Br. & Sch. 94, 155
  adnatum Aust. 155
  fluviatile (Sw.) Br. & Sch. 93, 155, 157
  irriguum (Wils.) Br. & Sch. 155, 156
  Juratzkanum Schimp. 155, 156
  Kochii Br. & Sch. 155, 158
  Lescurii (Sull.) Aust. 155, 157
  noterophilum (Sull.) Holzing. 155, 156
  orthocladon Mac. & Kindb. 156
  radicale Br. & Sch. 156
  riparium (L.) Br. & Sch. 155, 157
  serpens (L.) Br. & Sch. 155
  varium (Hedw.) Lindb. 155, 156
Amphoridium Mougeotii Schimp. 112
Anacamptodon Brid. 91, 134
  splachnoides (Fröl.) Brid. 134
Andreæa Ehrh. 86
  petrophila Ehrh. 86, 87
  Rothii Web. f. & Mohr 86, 87
ANDREÆACEÆ 86
ANDREÆALES 86
Aneura multifida Dumort. 44
  pinnatifida Nees 44
  sessilis Spreng. 44
Anœctangium Hedw. 90, 112
  Mougeotii (Br. & Sch.) Lindb. 112
Anomodon Hook. & Tayl. 92, 137
  apiculatus Br. & Sch. 137
  attenuatus (Schreb.) Hüben. 137

PAGE

Anomodon minor (Beauv.) Fürn. . . . 137
obtusifolius Br. & Sch. 137
rostratus (Hedw.) Schimp. 137, 138
tristis Sull. 136
Anthoceros (Mich.) L. 75
levis L. 75
punctatus L. 75, 76
ANTHOCEROTACEÆ 75
ANTHOCEROTALES 75
Aphanorrhegma Sull. 91, 117
serratum (Hook. & Wils.) Sull. . . . 117
ARCHIDIACEÆ 95
Archidium Brid. 87, 95
ohioense Schimp. 95
Archilejeunea clypeata Schiffn. 72
Asterella Beauv. 40, 41
hemisphærica Beauv. 40
tenella (L.) Beauv. 41
Astomum Hampe 87, 106
Sullivantii Schimp. 106
Atrichum angustatum Br. & Sch. 173
crispum James 173
undulatum Beauv. 173
AULACOMNIACEÆ 125
Aulacomnium Schwaegr. 90, 125
heterostichum (Hedw.) Br. & Sch. . . 125
palustre (L.) Schwaegr. 125, 126

B

Barbula Hedw. 89, 108
cæspitosa Schwaegr. 107
fallax Hedw. 108
muralis Timm 109
papillosa C. Müll. 109
tortuosa Web. f. & Mohr 107
unguiculata (Huds.) Hedw. 108
Bartramia Hedw. 90, 127
Oederi Sw. 126
pomiformis (L.) Hedw. 127
BARTRAMIACEÆ 126
Bazzania S. F. Gray 48, 64
triangularis (Schleich.) Lindb. . . . 64
tricrenata (Wahl.) Trevis. 64
trilobata (L.) S. F. Gray 64
Blasia L. 43, 46
pusilla L. 46

PAGE

- **Blepharostoma** Dumort. 48, 66
  - trichophyllum (L.) Dumort. 66
- *Blepharozia ciliaris* Dumort. 66
- **Brachythecium** Br. & Sch. 94, 143
  - acuminatum (Hedw.) Kindb. 143, 145
  - acutum (Mitt.) Sull. 143, 144
  - campestre (C. Müll.) Br. & Sch. 143, 144
  - *lætum* Br. & Sch. 144
  - Novæ-Angliæ (Sull. & Lesq.) Jaeg. & Sauerb. 143, 146
  - oxycladon (Brid.) Jaeg. & Sauerb. 143, 144
  - plumosum (Sw.) Br. & Sch. 143, 145
  - populeum (Hedw.) Br. & Sch. 143, 146
  - rivulare Br. & Sch. 143, 145
  - Rutabulum (L.) Br. & Sch. 143, 144
  - salebrosum (Hoffm.) Br. & Sch. 143
  - Starkei (Brid.) Br. & Sch. 143, 146
  - velutinum (L.) Br. & Sch. 143, 147
- BRYACEÆ 117
- BRYALES 87
- *Bryhnia graminicolor* Grout 148
- **Bryum** (Dill.) L. 90, 119
  - argenteum L. 119, 120
  - bimum Schreb. 119
  - cæspiticium L. 119, 120
  - capillare L. 119, 120
  - *pseudotriquetrum* (Hedw.) Schwaegr. 119
  - *roseum* Schreb. 120
  - ventricosum Dicks. 119
- **Bruchia** Schwaegr. 87, 95
  - flexuosa (Schwaegr.) C. Müll. 95
  - Sullivantii Aust. 95
- **Buxbaumia** Haller 91, 172
  - aphylla L. 172
- BUXBAUMIACEÆ 172

C

- **Calliergon** (Sull.) Kindb. 93, 166
  - cordifolium (Hedw.) Kindb. 166
  - giganteum Schimp. 166
- **Calypogeia** Raddi 47, 48, 62
  - sphagnicola (Arn. & Perss.) Warnst. & Loeske 63
  - suecica (Arn. & Perss.) C. Müll. Frib. 63
  - Sullivantii Aust. 62, 64
  - tenuis (Aust.) Evans 63
  - Trichomanis (L.) Corda 63

PAGE
Camptothecium Br. & Sch. 94, 142
  nitens (Schreb.) Schimp. 142
Campylopus viridis Sull. & Lesq. 102
Catharinea Ehrh. 91, 172
  angustata Brid. 173
  crispa James 173
  Macmillani Holzing. 172, 173
  undulata (L.) Web. f. & Mohr 172, 173
Cephalozia Dumort. 48, 59
  bicuspidata (L.) Dumort. 59, 60
  catenulata auct. 61
  connivens (Dicks.) Lindb. 59, 60
  curvifolia (Dicks.) Dumort. 59, 60
  divaricata Dumort. 61
  fluitans (Nees) Spruce 59, 61
  lunulæfolia Dumort. 60
  serriflora Lindb. 60, 61
Cephaloziella (Spruce) Schiffn. 48, 61
  divaricata (Sm.) Schiffn. 61
  myriantha (Lindb.) Schiffn. 61, 62
Ceratodon Brid. 89, 97
  purpureus (L.) Brid. 97
Chiloscyphus Corda 47, 58
  ascendens Sulliv. 58
  pallescens (Ehrh.) Dumort. 58
  polyanthus (L.) Corda 58
Chrysohypnum (Hampe) G. Roth 94, 95, 158
  chrysophyllum (Brid.) Loeske 158
  hispidulum (Brid.) G. Roth 158
  polygamum (Br. & Sch.) Loeske 158, 159
  protensum (Brid.) Loeske 158, 159
  stellatum (Schreb.) Loeske 158, 159
Cirriphyllum Grout 93, 147
  Boscii (Schwaegr.) Grout 147
  piliferum (Schreb.) Grout 147
Claopodium (Lesq. & James) Ren. & Card. 92, 140
  pellucinerve (Mitt.) Best 140
Climacium Web. f. & Mohr 92, 170
  americanum Brid. 170
  Kindbergii Grout 170
Cololejeunea (Spruce) Schiffn. 49, 71
  Biddlecomiæ (Aust.) Evans 71
Conocephalum Wigg. 40, 41
  conicum (L.) Dumort. 41
Conomitrium Julianum Mont. 105

PAGE
Cratoneuron (Sull.) G. Roth 94, 159
  filicinum (L.) G. Roth 159
Cryphæa Mohr 92, 130
  glomerata Br. & Sch. 130
CRYPHÆACEÆ 130
Ctenidium (Schimp.) Mitt. 94, 161
  molluscum (Hedw.) Mitt. 161
Cylindrothecium cladorrhizans Schimp. . . . 132
  seductrix Sull. 133
Cynodontium virens Schimp. 99

D

DENDROIDACEÆ 176
Dichelyma Myrin 91, 130
  capillaceum (L.) Schimp. 130
Dichodontium Schimp. 88, 99
  pellucidum (L.) Schimp. 99
DICRANACEÆ 95
Dicranella Schimp. 88, 98
  heteromalla (L.) Schimp. 98
  rufescens (Dicks.) Schimp. 98
  varia (Hedw.) Schimp. 98, 99
Dicranum Hedw. 88, 100
  Bergeri Bland. 100, 101
  flagellare Hedw. 100, 101
  fulvum Hook. 100, 102
  fuscescens Turn. 102
  heteromallum Hedw. 98
  interruptum Brid. 102
  longifolium Ehrh. 100, 102
  montanum Hedw. 100, 101
  Schraderi Web. f. & Mohr 101
  scoparium (L.) Hedw. 100, 101
  spurium Hedw. 100
  undulatum Ehrh. 100
  varium Hedw. 99
  viride (Sull. & Lesq.) Lindb. . . . 102
Didymodon Hedw. 89, 108
  cylindricus Br. & Sch. 107
  rubellus (Hoffm.) Br. & Sch. 108
Diphyscium foliosum Mohr 171
Diplophylleia Trevis. 49, 67
  apiculata Evans 67
  taxifolia (Wahl.) Trevis. 67, 68
Ditrichum Timm 89, 96
  pallidum (Schreb.) Hampe 96, 97

PAGE

- **Ditrichum** tortile (Schrad.) Lindb. 96
  - vaginans (Sull.) Hampe 96
- **Drepanocladus** (C. Müll.) G. Roth 94, 167
  - aduncus (L.) Warnst. 167, 168
  - fluitans (L.) Warnst. 167, 168
  - intermedius (Lindb.) Warnst. 167, 168
  - Kneiffii (Schimp.) Warnst. 167
  - Sendtneri (Schimp.) Warnst. 167, 168
  - subaduncus Warnst. 167, 168
- **Drummondia** Hook. 89, 113
  - clavellata Hook. 113

E

- **Elodium** (Sull.) Warnst. 92, 142
  - paludosum (Sull.) Loeske 142
- **Encalypta** Schreb. 110
  - ciliata (Hedw.) Hoffm. 89, 110
  - contorta (Wulf.) Lindb. 89, 110
  - *streptocarpa* Hedw. 110
- **Entodon** C. Müll. 92, 132
  - cladorrhizans (Hedw.) C. Müll. 132
  - seductrix (Hedw.) C. Müll. 132, 133
- ENTODONTACEÆ 132
- **Ephemerum** Hampe 87, 116
  - crassinervium (Schwaegr.) C. Müll. 116
  - megalosporum (Aust.) Salm. 116
  - serratum (Schreb.) Hampe 116
- **Eurynchium** Br. & Sch. 92, 148
  - *Boscii* Jaeg. & Sauerb 147
  - diversifolium Br. & Sch. 148
  - graminicolor (Brid.) Ren. & Card. 148
  - hians (Hedw.) Jaeg. & Sauerb. 148, 149
  - *piliferum* Br. & Sch. 147
  - rusciforme (Neck.) Milde 148, 149
  - strigosum (Hoffm.) Br. & Sch. 148
  - *Sullivantii* Jaeg. & Sauerb. 148

F

- FABRONIACEÆ 134
- *Fimbriaria tenella* Nees 41
- **Fissidens** Hedw. 88, 91, 103
  - adiantoides (L.) Hedw. 103, 104
  - bryoides (L.) Hedw. 103
  - cristatus Wils. 103, 104
  - *decipiens* DeNot. 104
  - incurvus Schwaegr. 103, 104

PAGE

Fissidens *minutulus* Sull. 104
  obtusifolius Wils. 103, 104
  osmundoides (Sw.) Hedw. 103, 105
  subbasilaris Hedw. 103, 105
  taxifolius (L.) Hedw. 103, 105
FISSIDENTACEÆ 103
FONTINALACEÆ 128
Fontinalis (Dill.) L. 91, 128
  antipyretica L. 128, 129
  dalecarlica Schimp. 128, 129
  Lescurii Sull. 128, 129
  Novæ-Angliæ Sull. 128, 129
Forsstroemia Lindb. 92, 131
  trichomitria (Hedw.) Lindb. . . . 131
Fossombronia Raddi 43, 46
  foveolata Lindb. 46, 47
  salina Lindb. 46
  Wondraczekii (Corda) Dumort. . . . 46, 47
Frullania Raddi 49, 73
  Asagrayana Mont. 73
  Brittoniæ Evans 73, 74
  eboracensis Gottsche 73, 74
  Grayana auct. 74
  Hutchinsiæ auct. 72
  plana Sull. 73, 74
  riparia Hampe 73
  squarrosa (R. Bl. & N.) Dumort. . . . 73
  Tamarisci (L.) Dumort. 73, 75
  virginica Gottsche 74
Funaria Schreb. 89, 117
  hygrometrica (L.) Schreb. . . . 117
FUNARIACEÆ 116

G

Geocalyx Nees 48, 59
  graveolens (Schrad.) Nees 59
Georgia Ehrh. 172
  pellucida (L.) Rabenh. 91, 172
GEORGIACEÆ 172
Glyphomitrium Brid. 89, 110
  incurvum (Schwaegr.) Broth. . . . 110
Grimaldia Raddi 40, 41
  barbifrons Bisch. 41
  fragrans (Balb.) Corda 41
Grimmia Ehrh. 89, 111
  apocarpa (L.) Hedw. 111

PAGE

Grimmia conferta Funck 111
  Olneyi Sull. 111, 112
  pennsylvanica Schwaegr. 111
  pilifera Beauv. 111
GRIMMIACEÆ 110
Gymnostomum curvirostre Hedw. 106

H

Haplocladium C. Müll. 92, 139
  microphyllum (Sw.) Broth. . . . 139
  virginianum (Brid.) Broth. . . . 139
Haplohymenium Doz. & Molk. 92, 136
  triste (Cesati) Kindb. 136
Harpanthus Nees 48, 59
  scutatus (Web. f. & Mohr) Spruce . . 59
Hedwigia Ehrh. 90, 128
  albicans (Web.) Lindb. 128
  ciliata Ehrh. 128
HEDWIGIACEÆ 128
HEPATICÆ 38
Heterophyllon Kindb. 95, 165
  Haldanianum (Grev.) Kindb. . . . 165
Homalia (Brid.) Br. & Sch. 93, 132
  Jamesii Schimp. 132
Homalothecium Br. & Sch. 93, 134
  subcapillatum (Hedw.) Sull. . . . 134
Hygrohypnum (Lindb.) Loeske 93, 94, 169
  dilatatum (Wils.) Loeske 169
  eugyrium (Br. & Sch.) Loeske . . . 169
  Mackayi (Schimp.) Loeske 169, 170
  ochraceum (Turn.) Loeske 169, 170
  palustre (Huds.) Loeske 169
Hylocomium Br. & Sch. 95, 161
  brevirostre (Ehrh.) Br. & Sch. . . . 161
  splendens (Hedw.) Br. & Sch. . . . 161
  triquetrum Br. & Sch. 160
Hymenostylium Brid. 90, 106
  curvirostre (Ehrh.) Lindb. 106
HYPNACEÆ 142
Hypnum (Dill.) L. 94, 166
  abietinum L. 142
  acuminatum Beauv. 145
  acutum Mitt. 144
  adnatum Hedw. 155
  aduncum L. 167, 168
  alleghaniense C. Müll. 171

PAGE
Hypnum *Alleni* Lesq. & James 141
bergenense Aust. 159
Boscii Schwaegr. 147
brevirostre Ehrh. 161
campestre Bruch 144
chrysophyllum Brid. 158
confervoides Brid. 154
cordifolium Hedw. 166
Crista-Castrensis L. 162
cupressiforme L. 164
curvifolium Hedw. 164
cuspidatum L. 167
cylindrocarpum C. Müll. 151
delicatulum L. 141
demissum Wils. 151
denticulatum L. 153
deplanatum Schimp. 151
diversifolium Schimp. 148
elegans Hook. 152
eugyrium Schimp. 169
fertile Sendt. 163
filicinum L. 159
fluitans L. 168
fluviatile Sw. 157
giganteum Schimp. 166
gracile Br. & Sch. 139
Haldanianum Grev. 165
hamifolium Schimp. 168
hians Hedw. 149
hispidulum Brid. 158
imponens Hedw. 163
irriguum Wils. 156
lætum Brid. 144
latebricola Lindb. 153
Lescurii Sull. 157
minutulum Hedw. 140
molle auct. 169
molluscum Hedw. 161
Muellerianum Hook. f. 152
Muhlenbeckii Spruce 154
nitens Schreb. 142
Novæ-Angliæ Sull. & Lesq. 146
ochraceum Turn. 170
orthocladon Brid. 156
pallescens Br. & Sch. 163
paludosum Sull. 142

PAGE

Hypnum *palustre* Huds. 169
Patientiæ Lindb. 164
petrophilum Funck 146
piliferum Schreb. 147
plumosum Sw. 145
polygamum Wils. 159
populeum Hedw. 146
pratense Koch 165
pygmæum Sull. 140
radicale Wils. 156
recognitum Hedw. 141
recurvans Beauv. 150
reptile Michx. 163
revolvens Sw. 168
riparium L. 157
rivulare Bruch 145
rugosum Ehrh. 160
rusciforme Neck. 149
Rutabulum L. 144
salebrosum Hoffm. 143
Schreberi Willd. 166
scitum Beauv. 139
Sendtneri Schimp. 168
serpens L. 155
serrulatum Hedw. 150
splendens Hedw. 161
squarrosum L. 160
Starkei Hedw. 146
stellatum Schreb. 159
strigosum Hoffm. 148
Sullivantiæ Schimp. 153
Sullivantii Spruce 148
sylvaticum Huds. 153
triquetrum L. 160
turfaceum Lindb. 152
uncinatum Hedw. 168
velutinum L. 147

I

Isopterygium Mitt. 94, 151
deplanatum (Schimp.) Jaeg. & Sauerb. . . 151
elegans (Hook.) Lindb. 151
Muellerianum (Schimp.) Lindb. . . . 151, 152
turfaceum Lindb. 151, 152

J

AGE

Jamesoniella (Spruce) Steph. 47, 52
- autumnalis (DC.) Steph. 52

Jubula Dumort. 49, 72
- *Hutchinsiæ* auct. 72
- pennsylvanica (Steph.) Evans 72

Jungermannia (Rupp.) L. 47, 51
- *barbata* Schreb. 55
- cordifolia Hook. 51, 52
- *crenulata* Sm. 50
- *excisa* auct. 53
- lanceolata L. 51
- *Novæ-Cæsareæ* Evans 54
- pumila With. 51, 52
- *Schraderi* Mart. 52

JUNGERMANNIACEÆ 47

JUNGERMANNIALES 43

K

Kantia Trichomanis S. F. Gray 63
- *Sullivantii* Underw. 64

L

Lejeunea Libert 49, 72
- *calcarea* auct. 71
- cavifolia (Ehrh.) Lindb. 72
- *echinata* auct. 71
- *serpyllifolia* Libert 72

Lepidozia Dumort. 48, 65
- reptans (L.) Dumort. 65
- *setacea* auct. 65
- setacea (Web.) Mitt. 65
- *sphagnicola* Evans 65
- sylvatica Evans 65

Leptobryum (Br. & Sch.) Wils. 90, 117
- pyriforme (L.) Wils. 117

Leptodon trichomitrion Mohr 131

Leptotrichum pallidum Hampe 97
- *tortile* C. Müll. 96
- *vaginans* Schimp. 96

Leskea Hedw. 92, 138
- *denticulata* Sull. 133
- obscura Hedw. 138
- polycarpa Ehrh. 138
- *tristis* Cesati 136

LESKEACEÆ 135

LEUCOBRYACEÆ 102

PAGE

Leucobryum Hampe 88, 102
glaucum (L.) Schimp. 102
vulgare Hampe 102
Leucodon Schwaegr. 91, 130
brachypus Brid. 130, 131
julaceus (L.) Sull. 130
LEUCODONTACEÆ 130
Leucolejeunea Evans 49, 72
clypeata (Schwein.) Evans 72
Liochlæna lanceolata Nees 51
Lophocolea Dumort. 48, 57
Austini Lindb. 57
bidentata (L.) Dumort. 57
heterophylla (Schrad.) Dumort. . . . 57
minor Nees 57, 58
Lophozia Dumort. 48, 52
attenuata (Mart.) Dumort. 53, 55
barbata (Schreb.) Dumort. 53, 55
bicrenata (Schmid.) Dumort. 53
excisa (Dicks.) Dumort. 53, 54
gracilis (Schleich.) Steph. 55
incisa (Schrad.) Dumort. 53, 54
inflata (Huds.) M. A. Howe 52, 53
Lyoni (Tayl.) Steph. 53, 55
marchica (Nees) Steph. 53, 54
Muelleri (Nees) Dumort. 48, 52, 53
Novæ-Cæsareæ Steph. 54
porphyroleuca (Nees) Steph. 53, 54
ventricosa (Dicks.) Dumort. 53, 54
Lunularia (Mich.) Adans. 40, 42
cruciata (L.) Dumort. 42
vulgaris Raddi 42

M

Madotheca platyphylla Dumort. 71
Porella Dumort. 71
Marchantia (March. f.) L. 40, 42
polymorpha L. 42
MARCHANTIACEÆ 40
MARCHANTIALES 38
Marsupella Dumort. 49, 50
emarginata (Ehrh.) Dumort. 50
media (Gottsche) Schiffn. 50
sphacelata auct. 50
Sullivantii (De Not.) Evans 50
Mastigobryum trilobatum Nees 64

PAGE

- **Meesia** Hedw. 90, 126
  - triquetra (L.) Aongstr. 126
  - *tristicha* Br. & Sch. 126
- Meesiaceæ 126
- **Metzgeria** Raddi 43, 45
  - conjugata Lindb. 45
  - *furcata* auct. 45
- Metzgeriaceæ 43
- *Micromitrium megalosporum* Aust. 116
- Mniaceæ 121
- **Mniobryum** (Schimp.) Limpr. 90, 118
  - albicans (Wahl.) Limpr. 118
- **Mnium** (Dill.) L. 90, 121
  - affine Bland. 121, 123, 124
  - ciliare (Grev.) Lindb. 121, 123
  - cinclidioides Hüben. 121, 125
  - cuspidatum (L.) Leyss 121, 123
  - hornum L. 121, 122
  - marginatum (Dicks.) Beauv. 121, 122
  - medium Br. & Sch. 121, 123
  - orthorrhynchum Br. & Sch. 121, 122
  - punctatum (L.) Hedw. 121, 124
  - rostratum Schrad. 121, 123
  - rugicum Laur. 121, 123
  - *serratum* Schrad. 122
  - spinulosum Br. & Sch. 121, 122
  - *sylvaticum* Lindb. 123
- Musci 76
- **Mylia** S. F. Gray 47, 56
  - anomala (Hook.) S. F. Gray 56
- **Myurella** Br. & Sch. 92, 136
  - *Careyana* Sull. 136
  - gracilis (Weinm.) Lindb. 136
  - julacea (Vill.) Br. & Sch. 136

N

- **Nardia** S. F. Gray 47 50
  - crenulata (Sm.) Lindb. 50
  - crenuliformis (Aust.) Lindb. 50 51
  - hyalina (Lyell) Carr. 50 51
- **Neckera** Hedw. 91, 131
  - pennata (L.) Hedw. 131
- Neckeraceæ 131
- **Notothylas** Sull. 75
  - orbicularis (Schwein.) Sull. 75
  - *valvata* Sull. 75

O

PAGE

Octodiceras Brid. 88, 105
Julianum (Savi) Brid. 105
Odontoschisma Dumort. 47, 62
denudatum (Mart.) Dumort. . . . 62
prostratum (Sw.) Trevis. 62
Sphagni auct. 62
Oncophorus Brid. 88, 99
virens (Sw.) Brid. 99
ORTHOTRICHACEÆ 112
Orthotrichum Hedw. 89, 90, 113
anomalum Hedw. 113, 114
Braunii Br. & Sch. 113, 114
cupulatum Hoffm. 114
Lescurii Aust. 113, 114
ohioense Sull. & Lesq. 113, 114
psilocarpum James 114
pumilum Sw. 113, 115
pusillum Mitt. 113, 114
sordidum Sull. & Lesq. 113
strangulatum Sull. 114

P

Pallavicinia S. F. Gray 43, 45
Lyellii (Hook.) S. F. Gray 45
Pellia Raddi 43, 46
epiphylla (L.) Corda 46
Phascum L. 88, 108
cuspidatum Schreb. 108
Philonotis Brid. 90, 127
fontana (L.) Brid. 127
Phragmicoma clypeata Nees 72
Physcomitrium (Brid.) Br. & Sch. . . . 91, 117
pyriforme auct. 117
turbinatum (Michx.) C. Müll. . . . 117
Plagiochila Dumort. 47, 56
asplenioides (L.) Dumort. 56
porelloides Nees 56
spinulosa auct. 56
Sullivantii Gottsche 56
Plagiopus Brid. 90, 126
Oederi (Gunn.) Limpr. 126
Plagiothecium Br. & Sch. 94, 152
denticulatum (L.) Br. & Sch. . . . 152, 153
latebricola (Wils.) Br. & Sch. . . . 152, 153
Muhlenbeckii Br. & Sch. 154

PAGE

Plagiothecium Roeseanum Br. & Sch. . . . 152, 153
striatellum (Brid.) Lindb. 95, 152, 154
sylvaticum (Huds.) Br. & Sch. . . . 152, 153
Platygyrium Br. & Sch. 93, 132
repens (Brid.) Br. & Sch. 132
Pleuridium Brid. 87, 96
alternifolium (Dicks.) Rabenh. . . . 96
Sullivantii Aust. 96
PLEUROCARPI 87, 91
Pogonatum Beauv. 91, 174
alpinum Röhl. 175
brevicaule (Brid.) Beauv. 174
pennsylvanicum (Hedw.) Par. . . . 174
tenue (Menz.) E. G. Britton . . . 174
Pohlia Hedw. 90, 118
cruda (L.) Lindb. 118
nutans (Schreb.) Lindb. 118
proligera Lindb. 118
POLYTRICHACEÆ 172
Polytrichum (Dill.) L. 91, 174
alpinum L. 174, 175
commune L. 175, 176
formosum auct. 175
juniperinum Willd. 175, 176
ohioense Ren. & Card. 174, 175
piliferum Schreb. 175
strictum Banks. 175, 176
Porella (Dill.) L. 49, 70
pinnata L. 70, 71
platyphylla (L.) Lindb. 70, 71
rivularis (Nees) Trevis. 70, 71
Pottia Ehrh. 91, 109
truncata Fürn. 109
truncatula (L.) Lindb. 109
POTTIACEÆ 106
Preissia Corda 40, 42
quadrata (Scop.) Nees 42
Ptilidium Nees 49, 66
ciliare auct. 66
ciliare (L.) Nees 66
pulcherrimum (Web.) Hampe . . . 66
Ptilium (Sull.) De Not. 94, 162
Crista-Castrensis (L.) De Not. . . 162
Ptychomitrium incurvum Sull. 110
Pylaisia Br. & Sch. 93, 133
intricata auct. 133

PAGE

Pylaisia intricata (Hedw.) Br. & Sch. 133, 134
  Schimperi Card. 133
  subdenticulata Schimp. 93, 133, 134
  velutina Schimp. 134

R

Racomitrium Brid. 89, 112
  aciculare (L.) Brid. 112
Radula Dumort. 49, 69
  complanata (L.) Dumort. 70
  obconica Sull. 70
  tenax Lindb. 70
Rauia Aust. 92, 139
  scita (Beauv.) Aust. 139
Reboulia Raddi 40
  hemisphærica (L.) Raddi 40
Rhabdoweisia Br. & Sch. 88, 99
  denticulata (Brid.) Br. & Sch. . . . 99
Rhodobryum (Schimp.) Hampe 90, 120
  roseum (Weis) Limpr. 120
Rhynchostegium Br. & Sch. 93, 150
  cylindrocarpum Aust. 151
  deplanatum Sull. 151
  recurvans Aust. 150
  rusciforme Br. & Sch. 149
  serrulatum (Hedw.) Jaeg. & Sauerb. . . . 150
Rhytidiadelphus (Lindb.) Warnst. 95, 160
  squarrosus (L.) Warnst. 160
  triquetrus (L.) Warnst. 160
Rhytidium (Sull.) Kindb. 94, 160
  rugosum (Ehrh.) Kindb. 160
Riccardia S. F. Gray 43
  latifrons Lindb. 44
  multifida (L.) S. F. Gray 43, 44
  palmata (Hedw.) Carruth. 44, 45
  pinguis (L.) S. F. Gray 43, 44
  sinuata (Dicks.) Trevis. 43, 44
Riccia (Mich.) L. 38
  arvensis Aust. 38
  crystallina L. 39
  fluitans L. 39
  natans L. 39
  Sullivantii Aust. 39
RICCIACEÆ 38
Ricciella A. Br. 38
  crystallina (L.) Warnst. 38, 39

PAGE

Ricciella fluitans (L.) A. Br. 39
  Sullivantii (Aust.) Evans 39
Ricciocarpus Corda 38, 39
  natans (L.) Corda 39

S

Saelania Lindb. 89, 97
  cæsia (Vill.) Lindb. 97
  glaucescens (Hedw.) Broth. 97
Scapania Dumort. 49, 68
  albicans Aust. 67
  curta (Mart.) Dumort. 68
  dentata Dumort. 68, 69
  irrigua (Nees) Dumort. 68
  nemorosa (L.) Dumort. 68, 69
  undulata (L.) Dumort. 68, 69
Schwetschkeopsis Broth. 92, 132
  denticulata (Sull.) Broth. 132
Sematophyllum Mitt. 94, 150
  carolinianum (C. Müll.) E. G. Britton . . 150, 151
  recurvans (Michx.) E. G. Britton . . . 150
  tenuirostre (Br. & Sch.) E. G. Britton . . 150, 151
Sphærangium muticum Schimp. 108
SPHAGNACEÆ 76
SPHAGNALES 76
Sphagnum (Dill.) L. 76
  Acutifolia 77, 83
  acutifolium Ehrh. 77, 85
  compactum DC. 78, 81
  contortum Schultz 79, 85
  Cuspidata 78, 82
  cuspidatum Ehrh. 78, 83
  Cymbifolia 76, 80
  cymbifolium Ehrh. 79, 80
  dasyphyllum Warnst. 77, 78, 79, 85
  Dusenii C. Jens. 78, 83
  fimbriatum Wils. 77, 83
  fuscum (Schimp.) Klinggr. 77, 84
  Garberi Lesq. & James 78, 81
  Girgensohnii Russ. 77, 83
  imbricatum Horsch. 79, 80
  inundatum Russ. 79, 86
  laricinum Spruce 85
  medium Limpr. 79, 81
  obesum (Wils.) Warnst. 79, 85
  papillosum Lindb. 79, 80

PAGE

Sphagnum parvifolium (Sendt.) Warnst. . . 78, 82
  platyphyllum (Lindb.) Warnst. . . . 79, 86
  Polyclada 76, 81
  Pulchricoma C. Müll. 78, 82
  quinquefarium (Lindb.) Warnst. . . . 77, 84
  recurvum Beauv. 78, 82
  Rigida 78, 81
  rubellum Wils. 77, 83
  rufescens (Warnst.) Nees & Hornsch. . . 79, 86
  Squarrosa 78, 81
  squarrosum Pers. 78, 81
  subnitens Russ. & Warnst. 77, 84
  Subsecunda 78, 85
  subsecundum Nees 79, 86
  tenellum (Schimp.) Klinggr. 83
  tenerum (Aust.) Warnst. 77, 85
  teres (Schimp.) Aongstr. 78, 82
  Torreyanum Sull. 78, 82
  Warnstorfii Russ. 77, 84
  Wulfianum Girgens. 76, 81
Sphenolobus (Lindb.) Steph. 49, 55
  exsectus (Schmid.) Steph. 55
  Michauxii (Web. f. & Mohr) Steph. . . 55
Steetzia Lyellii Lehm. 45
Stereodon (Brid.) Mitt. 94, 162
  curvifolius (Hedw.) E. G. Britton . . 162, 164
  cupressiformis (L.) Lindb. 162, 164
  fertilis (Sendt.) Lindb. 162, 163
  imponens (Hedw.) Lindb. 162, 163
  Lindbergii (Mitt.) Warnst. 162, 164
  pallescens (Hedw.) Lindb. 163
  pratensis (Koch) E. G. Britton . . . 162, 165
  reptilis (Michx.) Mitt. 163
Systegium Sullivantii Schimp. 106

T

Tetraphis pellucida Hedw. 172
Thamnium Br. & Sch. 92, 171
  alleghaniense (C. Müll.) Br. & Sch. . . 171
Thelia Sull. 91, 135
  asprella (Schimp.) Sull. 135
  hirtella (Hedw.) Sull. 135
  Lescurii Sull. 135, 136
Thuidium Br. & Sch. 92, 141
  abietinum (L.) Br. & Sch. 140, 142
  Alleni Aust. 140, 141

PAGE

- **Thuidium** delicatulum (L.) Br. & Sch. 140, 141
    - *gracile* Br. & Sch. 139
    - *microphyllum* Best 139
    - minutulum (Hedw.) Br. & Sch. 139
    - *paludosum* Jaeg. & Sauerb. 142
    - pygmæum Br. & Sch. 140
    - recognitum (Hedw.) Lindb. 140, 141
    - *scitum* Aust. 139
    - *virginianum* Lindb. 139
- **Timmia** Hedw. 90, 127
    - cucullata Michx. 127
    - *megapolitana* auct. 127
- TIMMIACEÆ 127
- **Tortella** (C. Müll.) Limpr. 89, 107
    - cæspitosa (Schwaegr.) Limpr. 107
    - tortuosa (L.) Limpr. 107
- **Tortula** Hedw. 89, 109
    - montana (Nees) Lindb. 109, 110
    - muralis (L.) Hedw. 109
    - papillosa Wils. 109
- **Trichocolea** Dumort. 49, 67
    - tomentella (Ehrh.) Dumort. 67
- **Trichostomum** Hedw. 89, 107
    - cylindricum (Bruch) C. Müll. 107

U

- **Ulota** Mohr 90, 115
    - *americana* (Beauv.) Limpr. 115
    - *crispa* (Hedw.) Brid. 116
    - crispula Bruch 115, 116
    - Hutchinsiæ (Sm.) Hammar 115
    - Ludwigii Brid. 115
    - ulophylla (Ehrh.) Broth. 115, 116

W

- **Webera** Ehrh. 91, 171
    - *albicans* Schimp. 118
    - *nutans* Hedw. 118
    - sessilis (Schmid.) Lindb. 171
- WEBERACEÆ 171
- **Weisia** Hedw. 89, 106
    - viridula (L.) Hedw. 106

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